ORDER NO. KM69001308C1
F4

# Service Manual

Electronic Typewriter

# KX-R520

Panasonic

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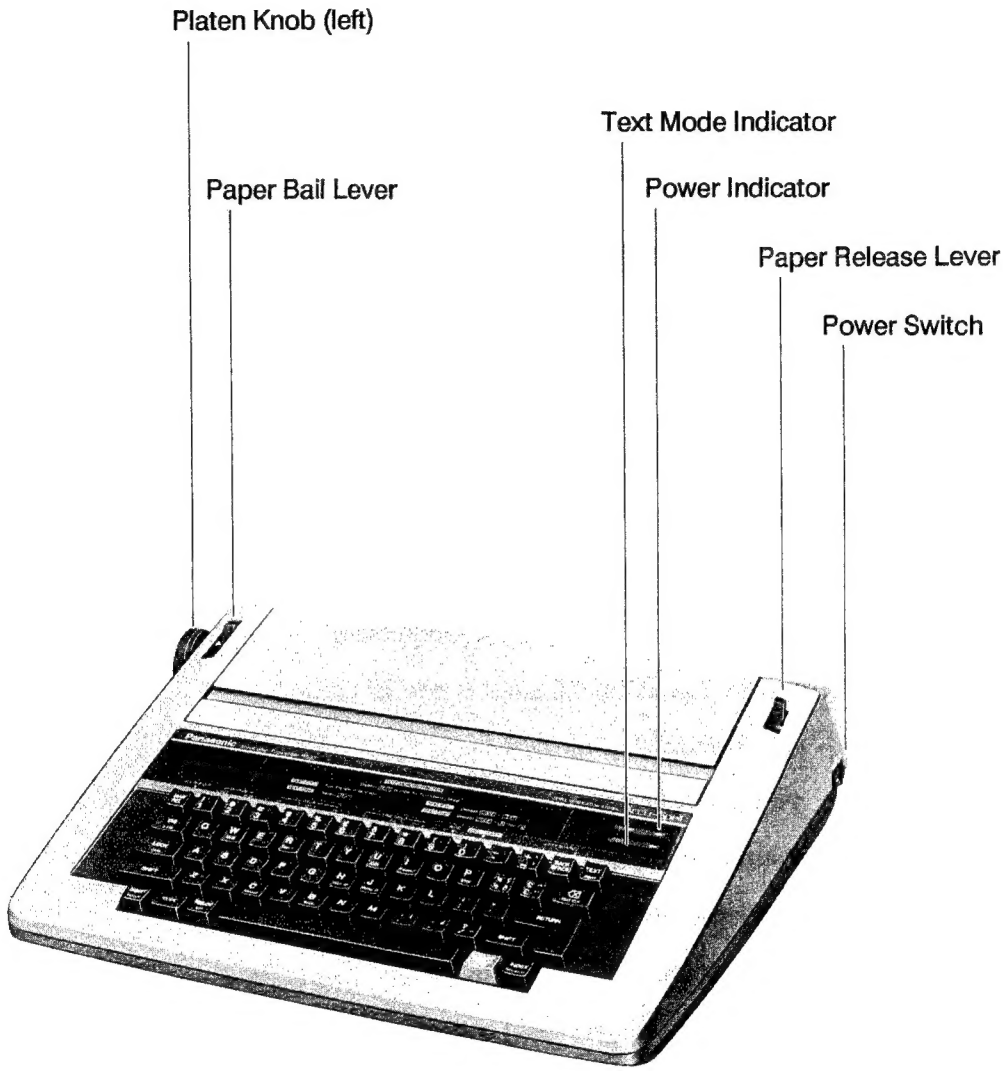
# 1. General Information

## 1.1 Specifications

| | | |
|---|---|---|
| Print Unit | Print Speed | 12 cps |
| | Print Element | Cassette type Daisywheel (Mono Plastic) 96 characters |
| | Typing Pitch | 10, 12, 15 |
| | Line Spacing | 1, $1\frac{1}{2}$, 2 |
| | Paper Width | 12" (304 mm) |
| | Writing Line | 10" (254 mm) |
| | Paper Capacity | Original + 1 |
| | Ribbon Cassette | Correctable, Fabric (Option) |
| | Correction Tape | Lift-off, Cover-up (Option) |
| Keyboard | | 45 Alpha/Numeric keys |
| Memory | Correction Memory | 1 line |
| | Text Memory | 2,500 characters |
| | Line Formats | 1 format |
| | Battery Backup | 5 years (Approx.) |
| Accu-Spell | Dictionary | 86,000 words |
| Power Requirements | Voltage | 120 V ± 10% |
| | Frequency | 60 Hz |
| | Power Consumption | 30 W |
| Operating Conditions | Temperature | 5°C (41°F) to 35°C (95°F) |
| | Humidity | 20%~80% RH |
| Dimensions | | $16\frac{13}{16}$" (W) × $14\frac{3}{8}$" (D) × $4\frac{3}{8}$" (H) (427 × 365 × 112 mm) |
| Weight | | Approx. 11 lbs. (5 kg) |

Specifications are subject to change without notice.

## 1.2 Name of Functions



## 1.3 List of Code Key Functions

The KX-R520 Electronic Typewriter has many functions for user operations and service operations.

a) User operations
These functions are executed by using the following CODE Key combinations. For more detailed information please refer to the KX-R520 Operating Instructions.

CODE + B ..... sets/releases BOLD print

CODE + C ..... centers information

CODE + H ..... Half spacing

CODE + I ..... sets/releases Paragraph Indent

CODE + J ..... moves the carriage by 1/60 inch ( Micro-Pitch Spacing)

CODE + K ..... initialize the Carriage

CODE + P ..... sets a Stop Code in a text

CODE + R ..... prints information with the last character on each line aligned at the right margin

CODE + U ..... sets/releases Continuous Underlining

CODE + W ..... sets/releases Word by Word Underlining

CODE + 〈X〉 ..... makes correction manually in normal mode

CODE + 〈X〉 and 〈X〉 .. clears a text

CODE + — ..... Permanent Hyphen

CODE + SPACE BAR .... Permanent Space

CODE + TAB ..... aligns decimal points at the tab stops

CODE + MAR REL ..... clears all tabs

CODE + LOCK ..... presets the unit for typing capital letters, lower case numbers, punctuation marks and symbols

CODE + RELOCK ..... moves the carriage to the beginning of the line without line spacing

CODE + TABSET ..... clears tab stops

CODE + TEXT ..... instructs the typewriter to start printing document in memory/stops deleting information in the middle of correcting

CODE + 1 ..... sets the left margin

CODE + 2 ..... sets the right margin

CODE + 3 ..... sets 10 pitch

CODE + 4 ..... sets 12 pitch

CODE + 5 ..... sets 15 pitch

CODE + 6 ..... sets single (1) line spacing

CODE + 7 ..... sets one and a half (1 1/2) line spacing

CODE + 8 ..... sets double (2) line spacing

CODE + 9 ..... sets manual/AUTO carriage return mode

CODE + 0 ..... turns ON/OFF the Accu-Spell

CODE + = ..... sets keyboard KBI

CODE + BACK SPACE.... sets keyboard KBII

CODE + INDEX ..... moves the paper down 1/2 line

CODE + RETURN ..... insert the paper automatically

CODE + QUICK ERASE ..... deletes one line at a time

b) Service operations
The following functions are for supporting service and are executed by turning ON the Power Switch while pressing the Key combinations shown below.

SHIFT + RELOC ..... Daisy home position is adjusted

SHIFT + TABSET ..... Check of ROM and RAM

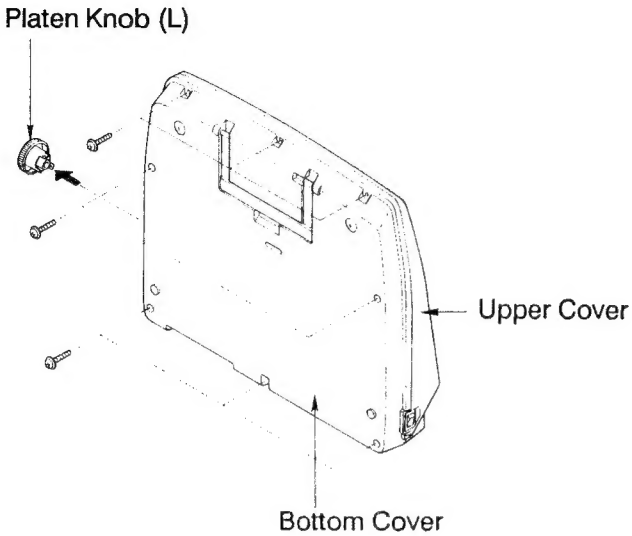
SHIFT + QUICK ERASE ..... Test of data printing

SHIFT ..... Demonstration

SHIFT + CODE ..... Clears all tabs, margins and RAM

# 2. Removal and Replacement Procedures

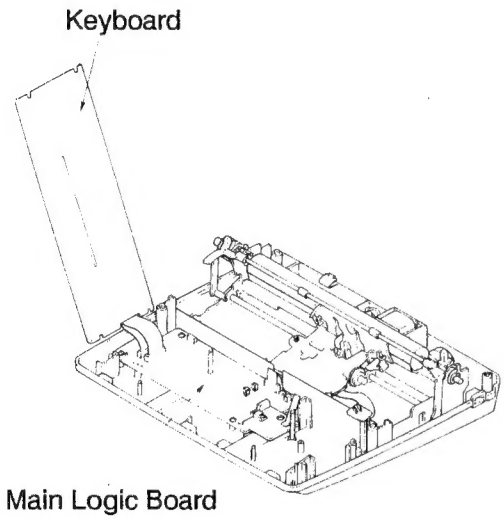
For reasons of safety and to avoid possible damage to electronic components, the AC Line Cord must be removed before disassembly.




## 2.1 Upper Cover

1) Remove the Platen knob from left side of the Platen.
2) Remove 3 screws from beneath the front edge of the Bottom Cover, 2 screws from the middle of the Bottom Cover and 3 screws from the rear.
3) Carefully lift and remove the Upper Cover while observing the left side of the Platen shaft.

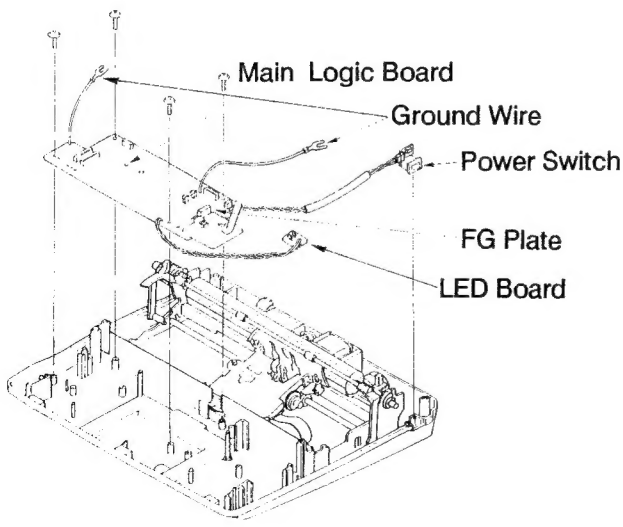
Replace in the reverse order.




## 2.2 Keyboard

1) Unplug the Keyboard flat cables CN5 and CN6 from the Main Logic Board.

Replace in the reverse order.



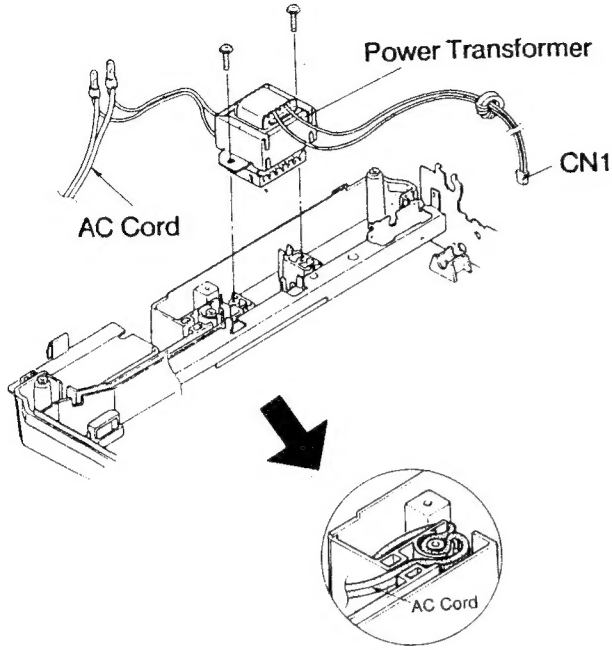

## 2.3 Main Logic Board

1) Release the Power Switch and LED Board from the Bottom Cover.
2) Unplug the Power Transformer connector CN401 from the Power Switch Board.
3) Unplug the Carrier Spacing Motor connector CN2, the Paper Feed Motor connector CN4, the Carrier flat cable CN3 and the Power Switch connector CN1 from the Main Logic Board.
4) Remove the 2 ground wire screws from the Chassis.
5) Remove the 4 screws () and lift out the Main Logic Board with the Power Switch.

**Note:**
When reinstalling the Main Logic Board, make sure that the FG Plate makes contact with the bottom of the Keyboard Frame to prevent RF interference.

Replace in the reverse order.

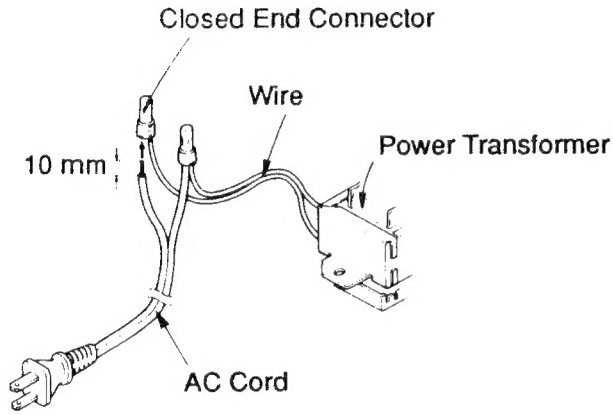
## 2.4 Transformer and AC Power Cord




1) Remove the 2 screws from the Power Transformer.
2) Remove the AC Cord and ES Core from the Bottom Cover.
3) Remove the Power Transformer with AC Cord.

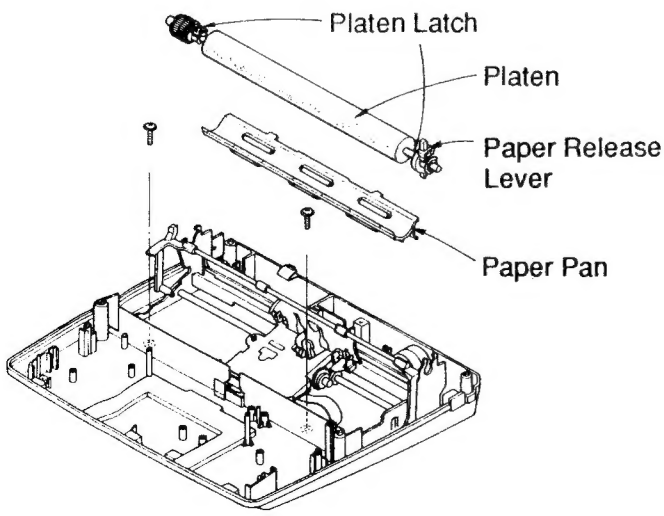
Replace in the reverse order.

**Note:**
When replacing the AC Cord, make sure that it is routed as shown in the illustration.




**Safety Notice:**
When replacing the Power Transformer and AC Cord, please follow the procedure below.
1) Carefully strip the lead ends and twist the wires together.
2) Fully insert the wire end into the closed end connector (Crimp-ON Type).
3) Firmly crimp the connector with appropriate tool.

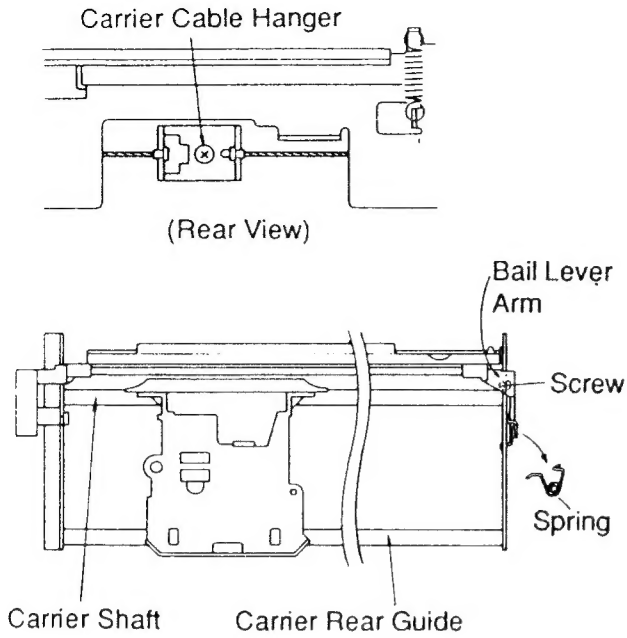
## 2.5 Chassis and Platen




1) Pull the right Paper Release Lever and remove the Platen by rotating the Platen Latches toward the front of the unit then lift the Platen from the Chassis.
2) Remove the 2 screws from the Chassis.
3) The Chassis can be removed.

Replace in the reverse order.

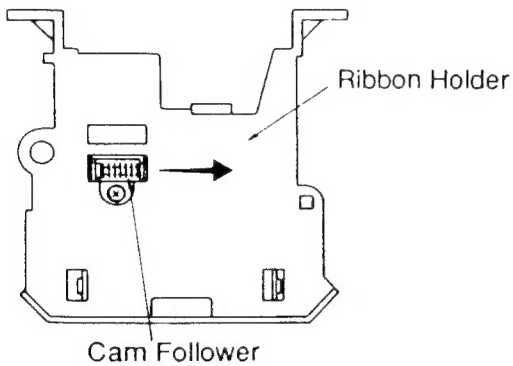
**Note:**
Connectors CN2, CN3, and CN4 must be unplugged before lifting the Chassis.
(refer to section 2.3)




## 2.6 Carrier

1) Unplug the flat cable from the Carrier.
2) Position the Carrier in front of the left side rear frame opening.
3) Remove the screw from the Carrier Cable Hanger.
4) Remove the screw from the right side frame.
5) Remove the spring from the right Bail Lever Arm.
6) Carefully move the Bail Lever Arm from the end of the Carrier Shaft.
7) Carefully slide the Carrier Shaft to the right.
8) Remove the Carrier.

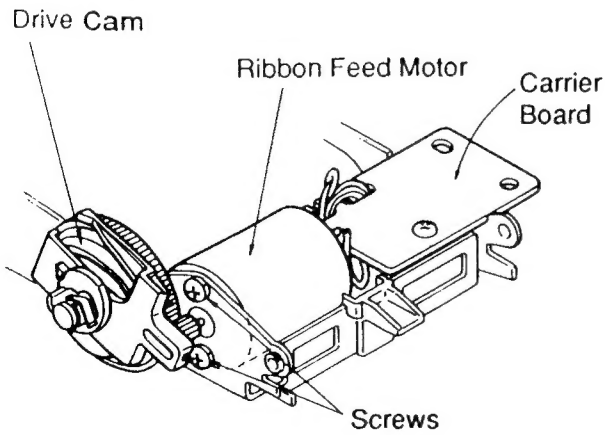
Replace in the reverse order.




## 2.7 Ribbon Holder

1) Pull the Cam Follower out of the groove in the Drive Cam.
2) Slightly slide the Ribbon Holder to the right and remove it upward.

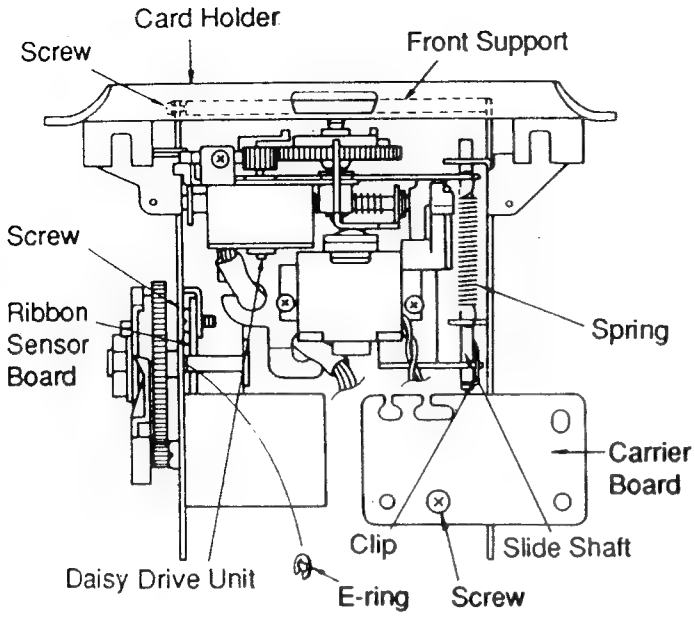
Replace in the reverse order.




## 2.8 Ribbon Feed Motor

1) Unsolder the Motor leads from the Ribbon Feed Motor.
2) Remove the 2 screws from the Motor.

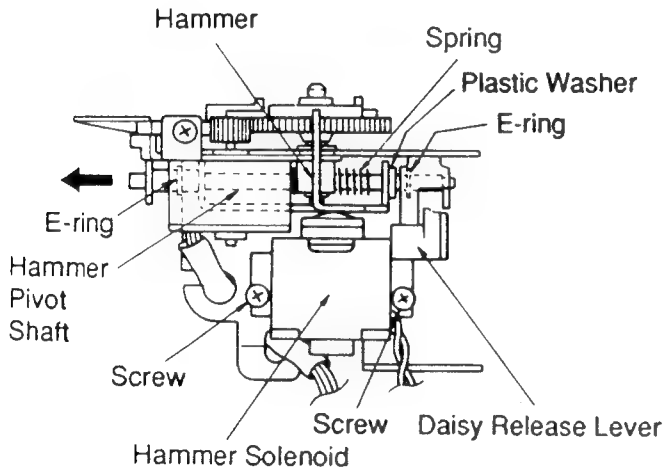
Replace in the reverse order.




## 2.9 Daisy Drive Unit

1) Remove the Front Support and the Card Holder by removing the screw.
2) Remove the E-ring and the Drive Cam.
3) Remove the screw from the Ribbon Sensor Board.
4) Remove the screw from the Carrier Board.
5) Remove the spring.
6) Remove the Clip from the Slide Shaft.
7) Remove the Slide Shaft by pulling it to the front.
8) Carefully lift off the Daisy Drive Unit, Carrier Board and Ribbon Sensor Board together.

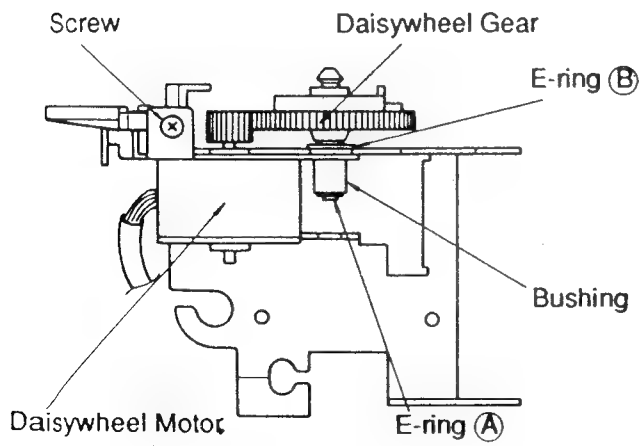
Replace in the reverse order.

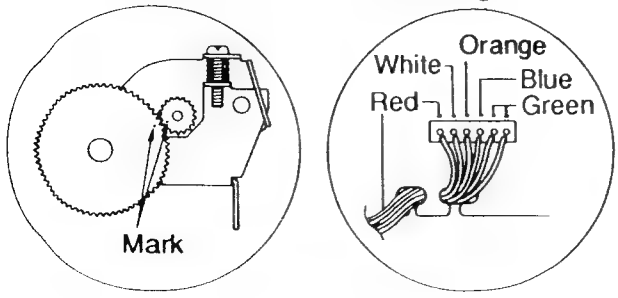



## 2.10 Hammer and Hammer Solenoid

1) Remove the E-rings from the Hammer Pivot Shaft.
2) Slide the Shaft to the left and remove the Hammer with the plastic washer and spring.
3) Remove the 2 screws from the Hammer Solenoid.
4) Remove the Solenoid.
5) Unsolder the Solenoid leads from the Carrier Board.

Replace in the reverse order.



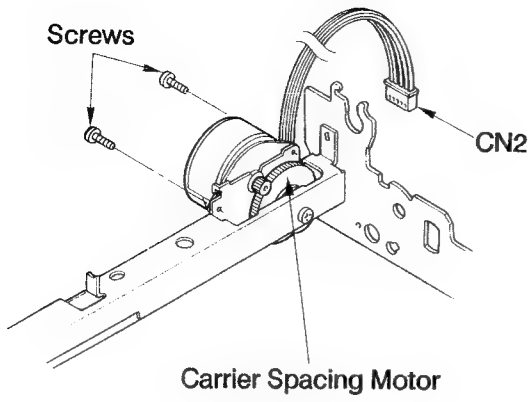




## 2.11 Daisywheel Motor

1) Remove the E-ring Ⓐ from the Daisywheel Gear Shaft.
2) Pull the Daisywheel Gear forward to remove.
3) Remove the screw from the Daisywheel Motor.
4) Remove the E-ring Ⓑ from the Daisywheel Shaft bushing.
5) Remove the Bushing.
6) Remove the Motor.
7) Unsolder the Motor leads from the Carrier Board.

Replace in the reverse order.

During replacement check the following:
- Make sure that leads match with indicated color as shown in the figure.
- Make sure that the marks on the two Daisywheel Drive Unit Gears are aligned.

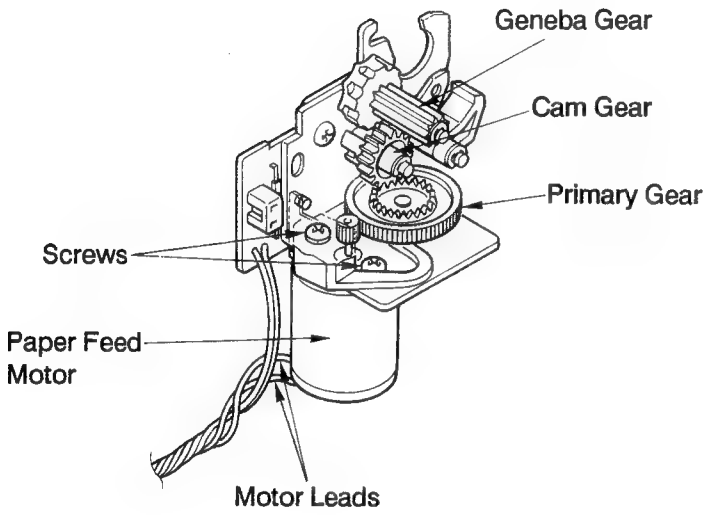



## 2.12 Carrier Spacing Motor

1) Remove the 2 screws and disengage the motor from the Cable Drum.

Replace in the reverse order.

**Note:**
Connector CN2 must be unplugged before removing the motor as in section 2.3.

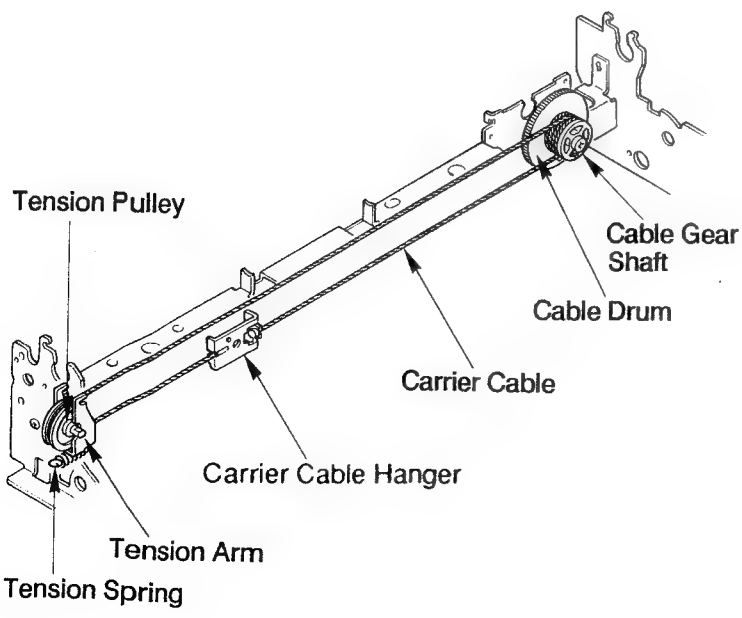



## 2.13 Paper Feed Motor

1) Remove the 2 E-rings from the Paper Feed Cam Gear and Geneba Gear.
2) Remove the Paper Feed Cam Gear.
3) Remove the Geneba Gear.
4) Remove the Primary Gear by lifting out.
5) Remove the 2 screws and pull the Motor downward to remove it.
6) Unsolder the Motor leads.

Replace in the reverse order.

**Note:**
When replacing the Primary Gear and Paper Feed Cam Gear, make sure that the marks on the each Gear are aligned as shown in the illustration.



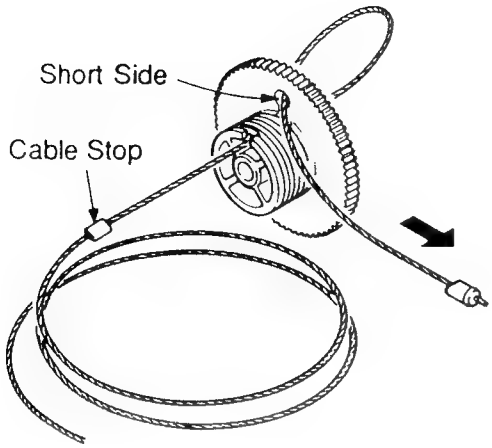

## 2.14 Carrier Cable

1) Remove the Tension spring from the Tension Arm.
2) Remove the Tension Arm from the frame.
3) Remove the Cable Gear Shaft screw and the Cable Drum.
4) Release the cable ends from the Carrier Cable Hanger.
5) Unwind the Carrier Cable.

Replace in the reverse order.

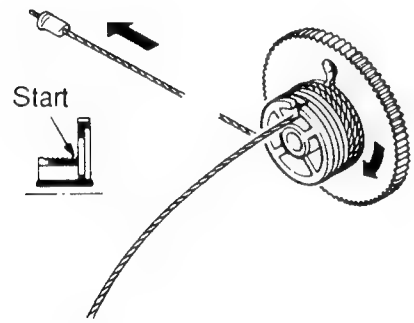
Follow the next step 2.15 for winding the cable on the Drum.

## 2.15 Carrier Cable Winding

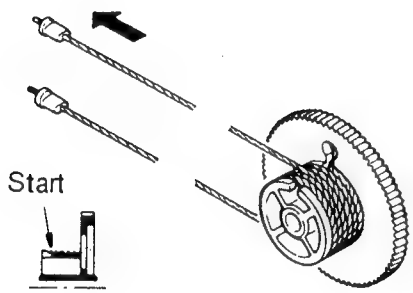



**Note:**
Use of Carrier Cable Jig No. PJZXXR250M will make cable installation much easier, as illustrated.

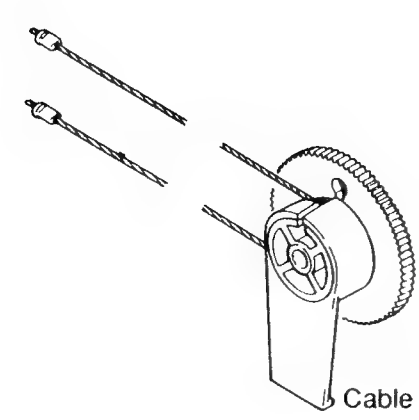
1) Insert the short end of the cable through the lower hole and back through the upper hole, pulling until the cable stops.




2) Wind the short cable end 3 full turns clockwise around the drum, starting in the first groove and hold while proceeding with Step "3".



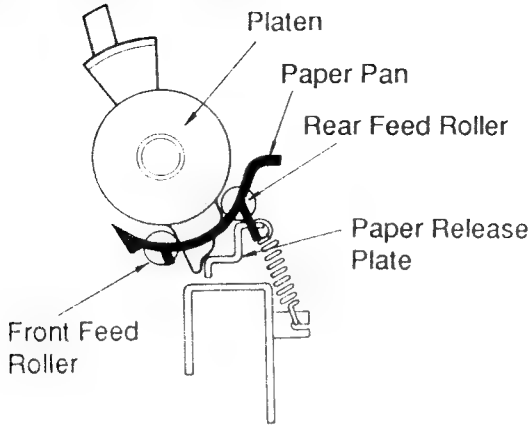

3) Wind the long cable end 4 full turns counterclockwise around the drum, starting in the first groove from the outside, and hold.




4) Slide the Carrier Cable Jig onto the drum, as illustrated, with the cable ends through the Jig opening.

**Note:**
- The cable can be held in place with tape if the Jig is not available.
- Pull the Carrier Cable Jig downward to remove.

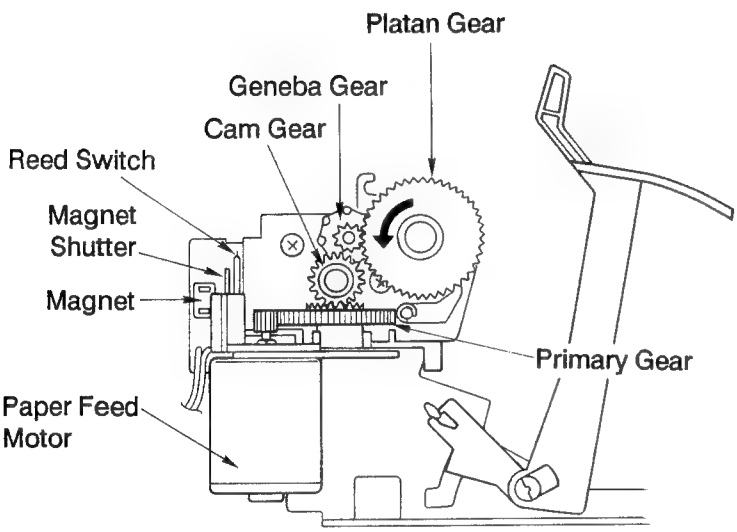
# 3. Mechanical Functions and Adjustments




(Right Side View)

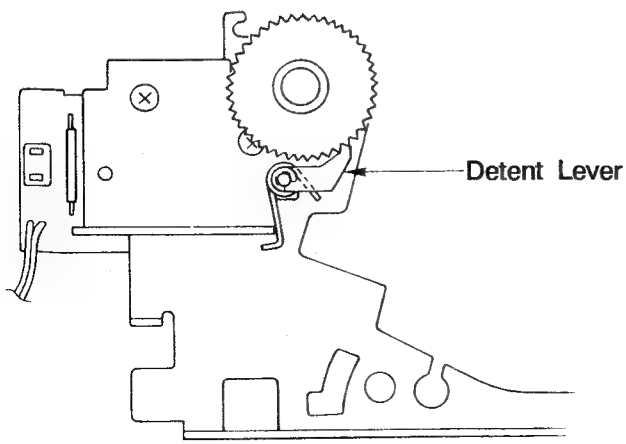
## 3.1 Paper Feed Mechanism

The paper feed mechanism, mounted on the Chassis, consists of the Platen, a spring-loaded Paper Release Plate and a floating Paper Pan which has 3 front and 3 rear Feed Rollers. As paper is inserted, it is guided between the rear Feed Rollers and the Platen, where it is gripped and fed as the Platen rotates. The paper can be advanced manually through use of either Platen Knob.



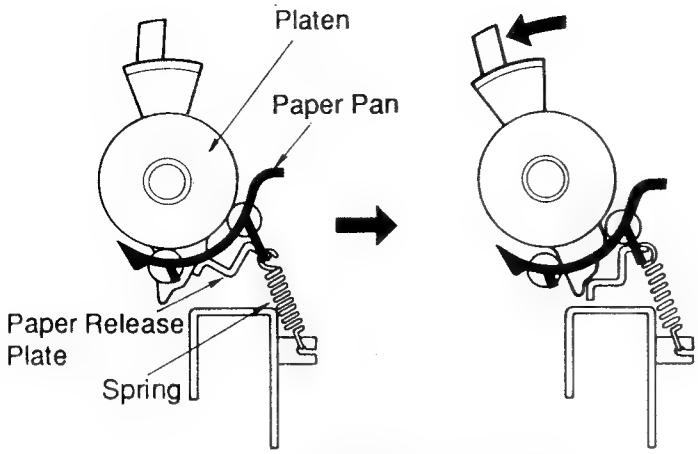

## 3.2 Paper Feed Motor

Drive for the Platen is provided by a DC Motor, which rotates the Platen through a Primary Gear, Paper Feed Cam Gear and Geneba Gear engaged with the Platen Gear. One complete revolution of the Primary Gear provides 1/2 line space movement to the Platen. As the Motor is energized, it begins to rotate counterclockwise (viewed from the top) and its Gear causes the Primary Gear to rotate clockwise then the Paper Feed Cam Gear turns the Geneba Gear intermediately by Cam movement, which turns the Platen Gear for advancing the Platen. The Home Detecting Lever is activated by Cam rotation and Magnet Shutter mounted on the top of the Home Detecting Lever turns the Reed Switch off. The Motor and Gear continue to turn through momentum until a full revolution has been completed. After rotation is completed, Platen position is maintained by a spring-loaded Detent which is engaged with the Platen Ratchet. The Paper Feed Motor is actuated whenever the Carrier return key is depressed.




## 3.3 Line Space Detent

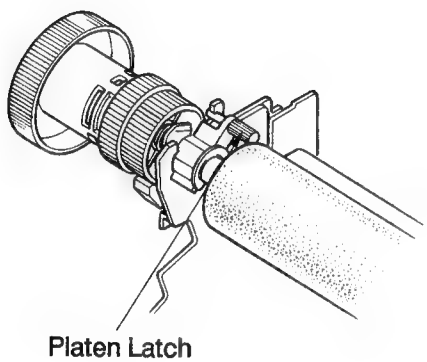
After each line space operation, the Detent Lever is fully seated between 2 platen gear teeth by the tension of the spring attached to the Detent shaft to obtain proper line space operation.




(Right Side View)

## 3.4 Paper Release Mechanism

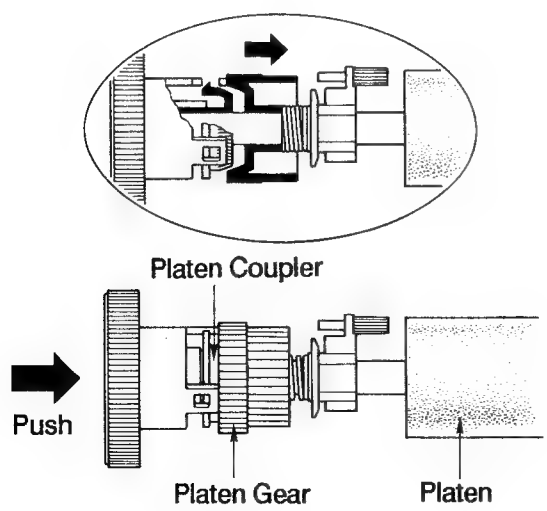
The Feed Roller and Paper Pan assembly is held against the Platen by the tension of 2 coil springs attached to a Paper Release Plate.
Pulling the Paper Release Lever forward causes the Paper Release Plate to move downward, increasing the tension on the coil springs and allowing the Feed Rollers to move away from the Platen.




## 3.5 Platen Latches

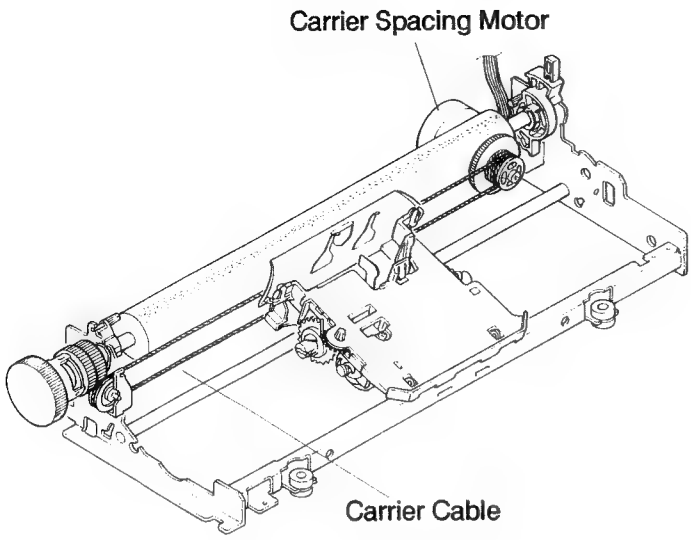
The Platen is held securely in place by molded plastic rotary clamps installed on both ends of the platen. The design of the Latches provides secure latching without the need of adjustment, and permits easy Platen removal and replacement.

**Note:**
Hold the Paper Release Lever vertical when replacing the Platen.




## 3.6 Platen Variable Clutch Mechanism

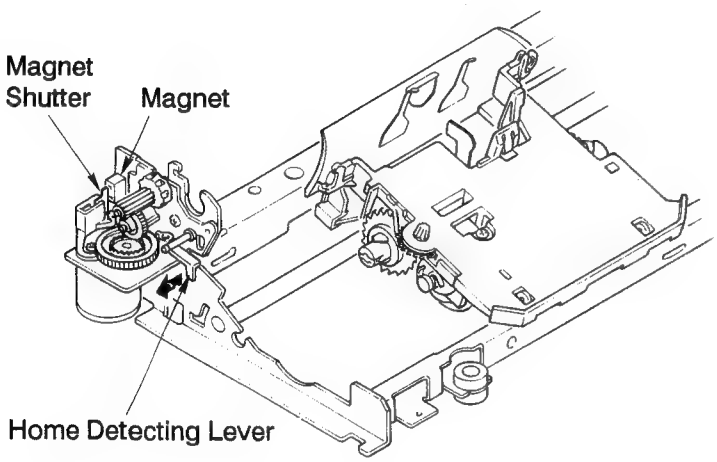
Normally rotational movement of the Platen Knob transmitted directly to the Platen, causes the engaged Platen Gear to turn, limiting Platen movement to 1/2 space (1 tooth) increments. When the left Platen Knob is pushed to the right, the spring loaded Platen Gear is moved to the right, disengaging its clutch teeth from those inside the Platen Coupler, and allowing Platen rotation without turning the Platen Gear. This permits Platen movement in very small increments.




## 3.7 Carrier Spacing

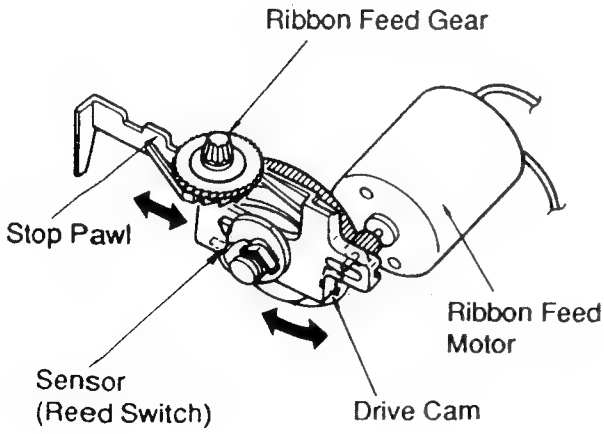
Carrier movement is provided by a stepping motor controlled by the Logic Board. Motor rotation is transmitted via a cable and pulley to the Carrier, changing the rotational motor movement to horizontal Carrier movement. The Carrier Motor is a stepping motor which operates in 7.5° increments for each pulse received. Each 7.5° step of the Motor provides carrier movement of 1/120" to the left or right, requiring the following number of steps, or pulses, per space, depending on pitch:

15 pitch= 1/15" = 8 steps
12 pitch= 1/12" =10 steps
10 pitch= 1/10" =12 steps



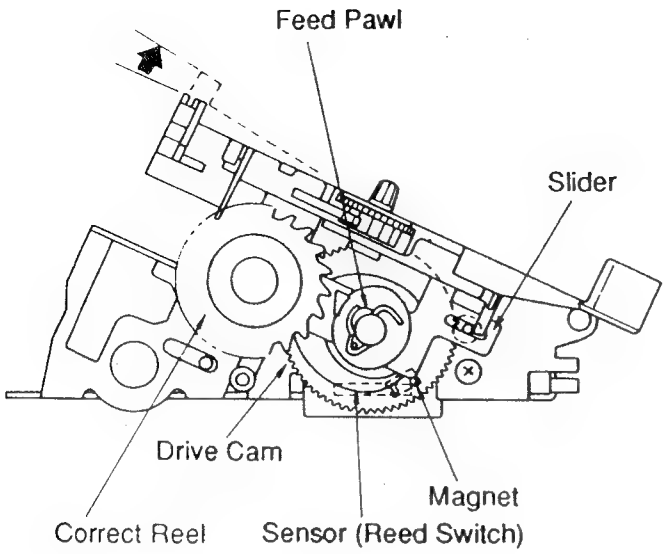

## 3.8 Carrier Home Sensor

The chassis is equipped with a limit Sensor to notify the CPU when the Carrier approaches its home position, the Home Detecting Lever is activated by the Card Holder and the Magnet Shutter mounted on the top of the Home Detecting Lever turns the Reed Switch off, generating the signal and indicating the carrier home position to the CPU.



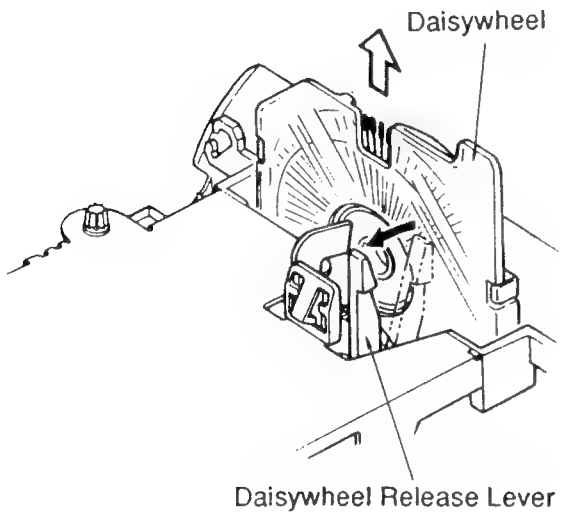

## 3.9 Ribbon Feed

Ribbon Feed Drive is provided by a bi-directional DC motor, which also provides Correction Tape Lift and Feed, depending on which direction the motor is initially activated. The home, or starting position of the motor is determined by a magnetic sensor which senses the location of the magnet affixed to the inner surface of the Drive Cam. During a character printing operation, the Motor is energized and turns the Drive Cam in a counterclockwise direction (view from the left), until the magnet passes its sensor (Reed Switch). This one rotational movement of the Cam Feed Gear, which then advances the Ribbon Feed Gear and the Ribbon. A Stop Pawl prevents reverse movement of the Feed Gear.




## 3.10 Correction Tape Feed

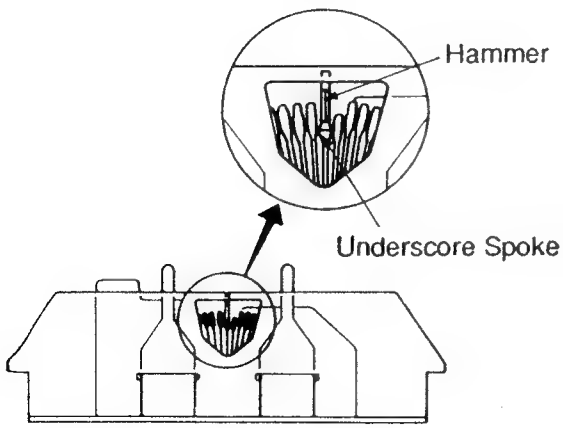
During a correction operation the Motor is energized, turning the Drive Cam in a clockwise direction approximately 180°, until the magnet passes its sensor (Reed Switch), at which time it reverses direction and returns to its home position. The Drive Cam's rotational movement is changed to vertical movement by the Cam Follower in the eccentric groove on the back of the Drive Cam, lifting the Ribbon Holder to its upper position. As the Motor lifts the Holder to its upper position, the tip of the Feed Pawl which pivots on the Slider engages the Feed Gear and continues upward movement causing the Feed Gear to be advanced by one tooth. The Stop Pawl (leaf spring) prevents reverse movement of the Correct Reel.




## 3.11 Daisywheel Motor and Character Printing

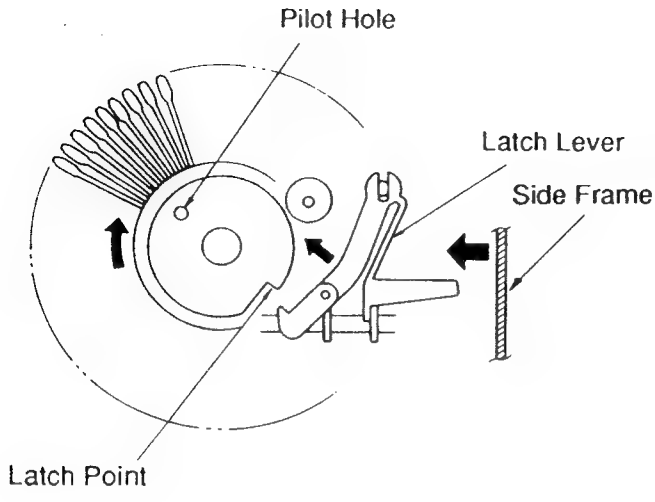
a) Daisywheel Motor

The Daisywheel Stepping Motor is mounted within the Carrier frame, and is controlled by the CPU. When a key is depressed, a signal is generated on the Main Logic Board, energizing the Motor and causing it to rotate to the desired point, step by step. Each step of the motor provides for 3.75° or one character spoke movement of the Daisywheel. The home position of the Motor corresponds to the underscore character on the Daisywheel being positioned at the printing point. In this position, the Impact Hammer must be aligned with the projection at the back of the underscore spoke. Pulling back on the Daisywheel Release Lever pushes down the Lock bar and moves the Motor away from the Platen. The Daisywheel Gear shaft and Pilot pin are disengaged from the Daisywheel, allowing the Daisywheel to the removed. Upon installation of the Daisywheel, pushing the lever forward firmly latches the Motor in the printing position. If the Pilot pin does not engage in the Pilot hole of the Daisywheel, it will re-engage automatically when the Carrier returns to the home position during initialization.




b) Character Printing

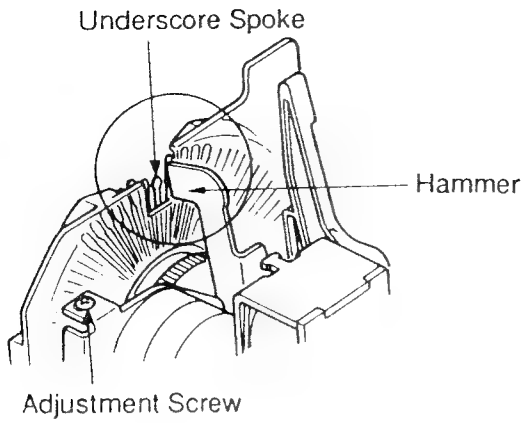
Once the Daisywheel has moved to the desired character, the Hammer Solenoid is energized by the CPU, causing the Hammer to move rapidly toward the Daisywheel, driving the character spoke into contact with the Platen. The strength of this impact is determined by the length of time the solenoid is energized, which is automatically controlled by the CPU corresponding to character surface area.




## 3.12 Initializing

Initialization is automatically performed when the power switch is turned on. When the power switch is turned on, the Carrier moves to the far left, then the Daisywheel Home Latch Lever is pushed inward by the left side frame and the Daisy Gear turns 2 revolutions. While the Daisywheel is turning, the Home Latch Lever catches the Daisywheel's latch point locating the Daisywheel home position and the Pilot Pin on the Daisy Gear engages in the Pilot hole in the Daisywheel. The Carrier then returns to the Carrier home position.

**Note:**
If the Power Switch is turned off and on quickly, initialization may not be performed.



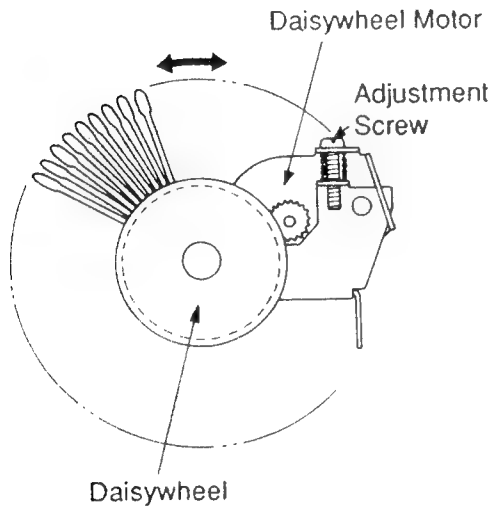

## 3.13 Daisy Home Position Adjustment

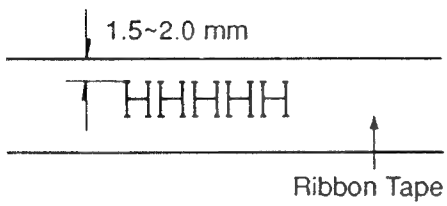
Each spoke must be directly aligned with the Hammer when its character key is depressed. If necessary or when installing a new motor, adjust as follows.

**Important Note:**

The Daisywheel Motor must only be adjusted in the "DAISY ADJ" mode with power supplied to the motor. In the "DAISY ADJ" mode the Daisywheel motor will be energized for 2 minutes.

1) Install a Daisywheel and latch the motor in printing position.
2) Initialize the Daisywheel as in section 3.12.
3) Press the SHIFT+RELOC keys and turn on the power at the same time.
4) Manually push the Hammer toward the Daisywheel, and observe the underscore spoke locator in relation to the Hammer groove. If the Hammer is not aligned with the underscore spoke, follow the next step.
5) Align the Hammer groove with underscore spoke locator by turning the Adjustment screw. After adjusting the position, observe the alignment by repeating steps 2) 3) 4).
6) Apply a locking compound to the Adjustment screw to prevent loosening.

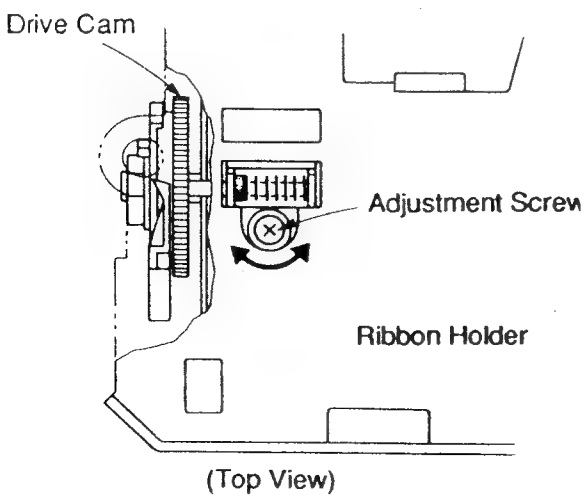



## 3.14 Ribbon Lift Adjustment

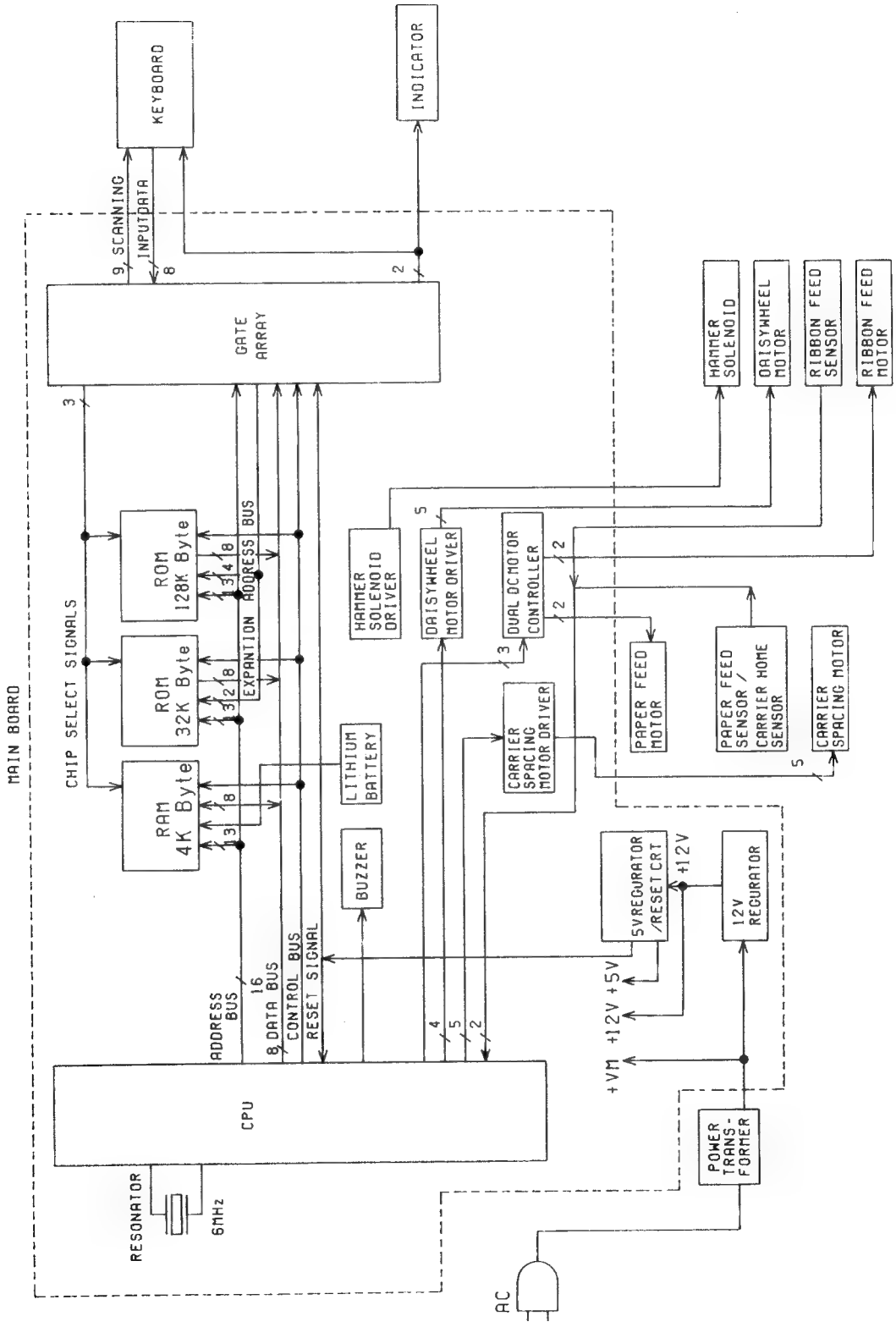
The typed character must strike near the upper edge of the Ribbon (See the illustration). Check by typing several characters and observing their position on the Ribbon.

1) The tops of capital letters should be 1.5 to 2.0 mm from the upper edge of the Ribbon.
2) If the character is not in the proper position, adjust the position by turning the adjustment screw. Turning the screw clockwise will raise the position of the characters on the ribbon and counterclockwise will lower the position.



# 4. Electronic Circuit Descriptions and Diagrams

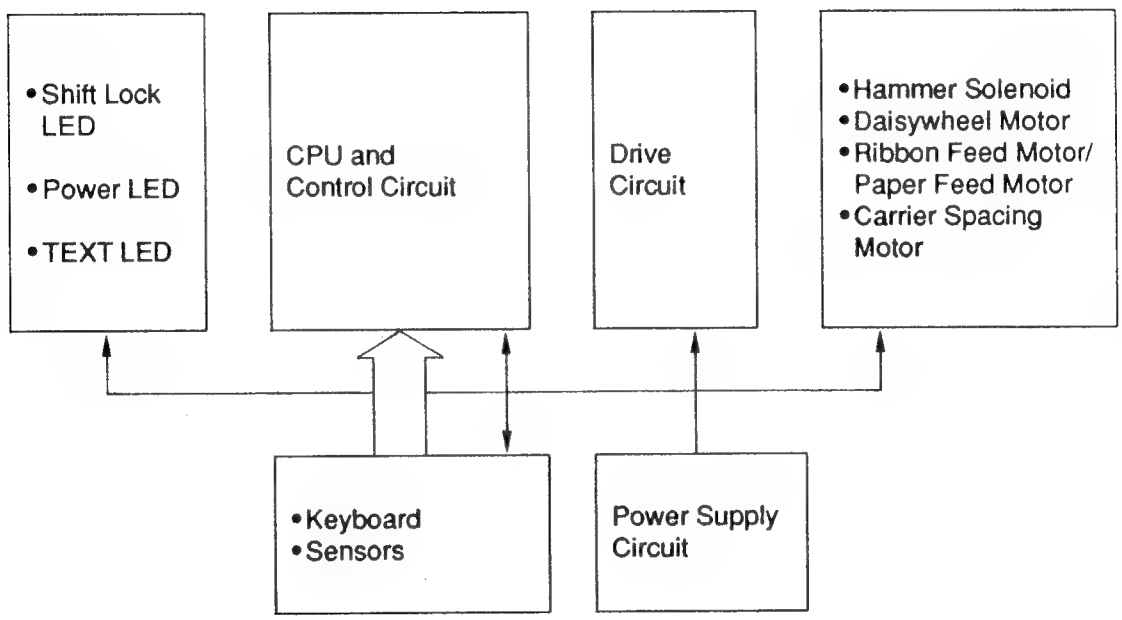
Block Diagram



## 4.1 Principle of Operation

This chapter explains the basic operation of the electronic circuitry for this typewriter.

This typewriter is mainly composed of control, drive, power supply circuits, motors, print hammer, keyboard and sensors. The control circuit is composed of ROM, RAM, Gate Array and CPU. Four drive circuits drive the carrier spacing motor, the daisywheel motor, paper/ribbon feed motors and the hammer solenoid. The power supply circuit supplies necessary voltage for all circuits. The keyboard is composed of 45 character keys and 15 function keys. Two sensors are used for detecting mechanical movement. They are magnetic sensors which are the ribbon feed sensor and the carrier home/paper feed sensor.

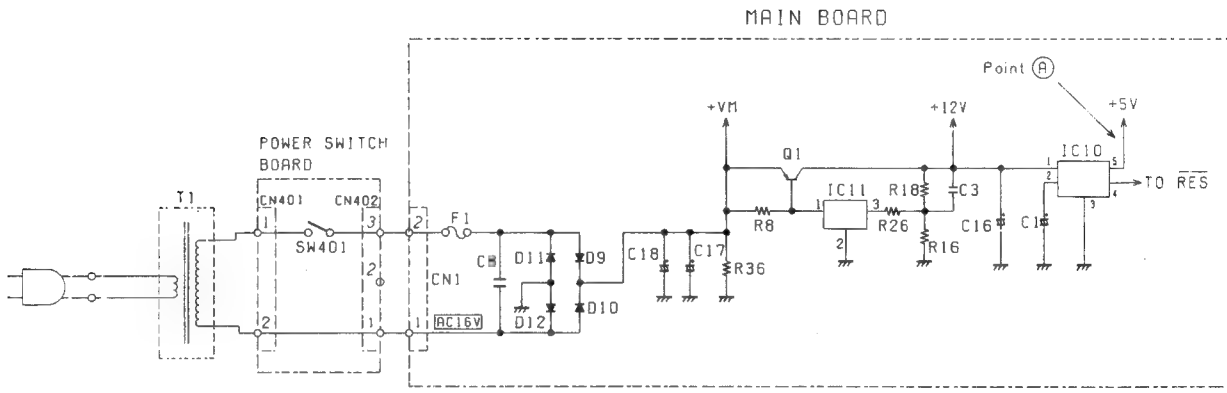


## 4.2 Power Supply

### 4.2.1 General Description

The 120 volt AC input is stepped down by transformer T1. The stepped down AC passes through the power switch SW401, rectified by diodes D9-D12 then filtered by C17 and C18. The filtered DC passes into the +12 volt and +5 volt regulator circuits.

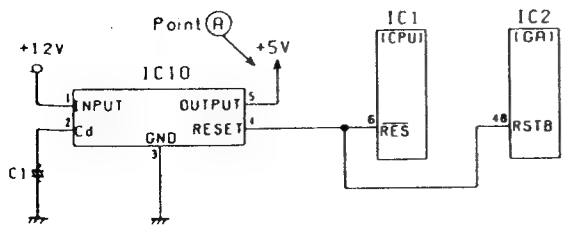
+VM -----Carrier Spacing Motor
+12 V ----Daisywheel Motor, DC Motors, Print Hammer, Buzzer
+5 V -----Logic Circuit



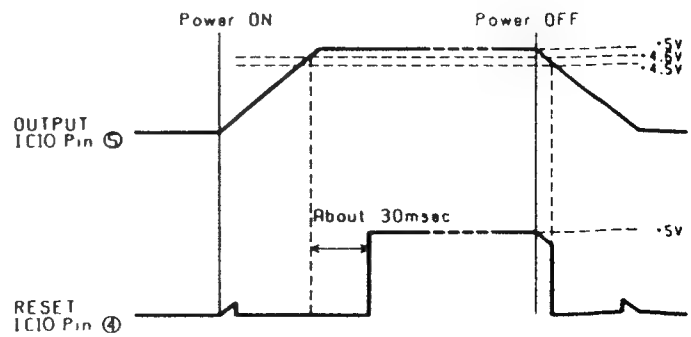

Voltage Condition: At standby condition
Note: VM = 19 V at standby condition
VM = 13-16 V at printing condition

a) +12 V Power Supply
The +12 V power supply uses a transistor (Q1) and a voltage regulator (IC11).
The collector of transistor (Q1) remains at +12 V by R18, R16, R26 and IC11.

b) +5 V Power Supply and Reset Circuit
The +5 V power supply contains a voltage regulator IC10, which reduces the voltage from +12 V to +5 V. This is a five pin device which also has built-in short circuit and thermal runaway protection. This device also contains the reset circuit which is provided to initialize the CPU (IC1) and Gate Array (IC2). The reset time is controlled by C1, which is connected to pin 2 of IC10. When the power switch (SW1) is turned on, the voltage at point Ⓐ rises. After the voltage at point Ⓐ rises over about +4.6 V, the reset signal, which is L level, is provided for 30 msec.



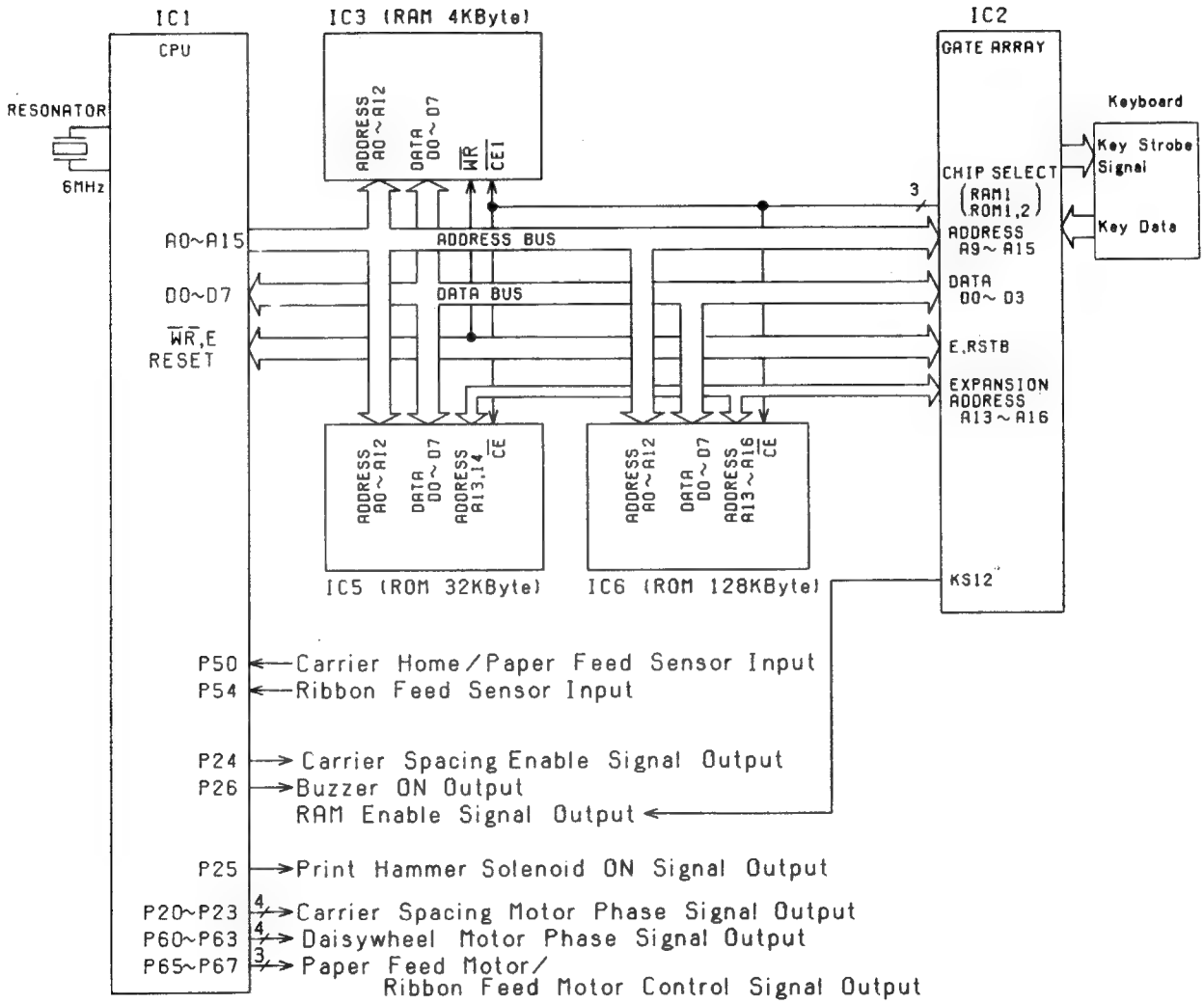

Timing Chart



## 4.3 CPU and Control Circuit

### 4.3.1 General Description

This block mainly consists of the CPU (IC1), ROM (IC5,6), RAM (IC3), and the Gate Array (IC2). The CPU receives key data from the keyboard through the Gate Array (IC2), processes the input from various sensors and function switches and controls the daisywheel, paper feed, carrier spacing, ribbon feed motors and the hammer solenoid.



### 4.3.2 CPU

This typewriter is a microprocessor controlled. It is controlled by a HD63B03x CPU "Central Processing Unit" IC1. The CPU has full control over all machine functions. It controls the printer mechanism, keyboard scanning, the display and memory management. The pin names and functions are shown in the following chart.

| NAME | FUNCTION | | | NAME | FUNCTION |
|---|---|---|---|---|---|
| Vss | GND | 1 | 64 | E | System Clock (1.5 MHz) |
| XTAL | RESONATOR Input (6 MHz) | 2 | 63 | RD | NC |
| EXTAL | | 3 | 62 | WR | WRITE Signal |
| MP0 | CPU Mode Select (+5V) | 4 | 61 | R/$\overline{W}$ | Not used |
| MP1 | CPU Mode Select (0V) | 5 | 60 | LIR | NC |
| RES | Reset | 6 | 59 | BA | NC |
| STBY | Not used (+5V) | 7 | 58 | D0 | Data Bus |
| NM1 | Not used (+5V) | 8 | 57 | D1 | |
| P20 | Carrier Spacing Motor Phase Signal | 9 | 56 | D2 | |
| P21 | | 10 | 55 | D3 | |
| P22 | | 11 | 54 | D4 | |
| P23 | | 12 | 53 | D5 | |
| P24 | Carrier Spacing Enable | 13 | 52 | D6 | |
| P25 | Print Hammer Solenoid ON Signal | 14 | 51 | D7 | |
| P26 | BUZZER | 15 | 50 | A0 | Address Bus |
| P27 | Not Used | 16 | 49 | A1 | |
| P50 | Carrier Home/Paper Feed Sensor | 17 | 48 | A2 | |
| P51 | Pull Up (+5 V) | 18 | 47 | A3 | |
| P52 | Pull Up (+5 V) | 19 | 46 | A4 | |
| P53 | Not used (+5 V) | 20 | 45 | A5 | |
| P54 | Ribbon Feed Sensor | 21 | 44 | A6 | |
| P55 | Not Used (+5V) | 22 | 43 | A7 | |
| P56 | Pull Up (+5 V) | 23 | 42 | Vss | GND |
| P57 | Pull Up (+5 V) | 24 | 41 | A8 | Address Bus |
| P60 | Daisywheel Motor Phase Signal | 25 | 40 | A9 | |
| P61 | | 26 | 39 | A10 | |
| P62 | | 27 | 38 | A11 | |
| P63 | | 28 | 37 | A12 | |
| P64 | Not used | 29 | 36 | A13 | |
| P65 | Paper Feed Motor/Ribbon Feed Motor Control Signal | 30 | 35 | A14 | |
| P66 | | 31 | 34 | A15 | |
| P67 | | 32 | 33 | Vcc | +5V |

### 4.3.3 Memory Map and Expansion Memory

The CPU (IC1) can manage a 64K byte memory area but this typewriter needs a 160K byte memory area to operate. The memory area consists of the following: a 32K byte operating program area, 8K byte RAM area, 96K byte dictionary area, and an I/O area.
The 64K byte management capability of the CPU is expanded by using two 8K byte windows. The expansion memory area consists of a 96K byte dictionary area which is divided into twelve 8K byte blocks, each having its own address code. When the CPU writes one of these address codes into a BANK register, the CPU can access that memory block through the BANK window by means of the expansion memory decode circuit. For example, when the CPU writes "60" (data) into the BANK 1 register, the CPU can access block 1 in IC6 (128K byte ROM) through the BANK 1 window.
The CPU's remaining 48K byte memory area is divided and assigned for 192 byte internal RAM, 4K byte RAM (IC3) area, interface area, and 32K byte operating program area.

The 32K operating program assignment: If the VECT terminal (IC2 Pin 46) is connected to +5 V, the operating program is located in the external ROM (IC5). If the VECT terminal (IC2 Pin 46) is connected to 0 V, the operating program is located in the bottom of the 128K byte ROM (IC6).

Memory Map (64K byte)

| ADDRESS | Used For |
|---|---|
| 0000<br>001F | Internal Register CPU (IC1) |
| 0020<br>003F | Not used |
| 0040<br>00FF | Internal 192 byte RAM CPU (IC1) |
| 0100<br>0BFF | Not used |
| 0C00<br>0DFF | Gate Array (IC2)<br>Key Scan Register |
| 0E00<br>11FF | Gate Array (IC2)<br>Key Matrix Date Input |
| 1200<br>15FF | Gate Array (IC2)<br>Output Port |
| 1600<br>19FF | Gate Array (IC2)<br>BANK0 Selection Register |
| 1A00<br>1DFF | Gate Array (IC2)<br>BANK1 Selection Register |
| 1E00<br>2FFF | Not used |
| 3000<br>3FFF | 4K byte RAM (IC3) |
| 4000<br>5FFF | BANK0 (8K byte) Window |
| 6000<br>7FFF | BANK1 (8K byte) Window |
| 8000<br>FFFF | *32K byte ROM (IC5/IC6)<br>Operating Program Area |

Expansion Memory Map (96K byte)

IC6
Top 96K byte In 128K byte

| BLOCK | CODE | NAME |
|---|---|---|
| 1 | 60 H | Dictionary Area 8K byte |
| 2 | 62 H | 8K byte |
| ⋮ | | ⋮ |
| 11 | 74 H | Dictionary Area 8K byte |
| 12 | 76 H | 8K byte |

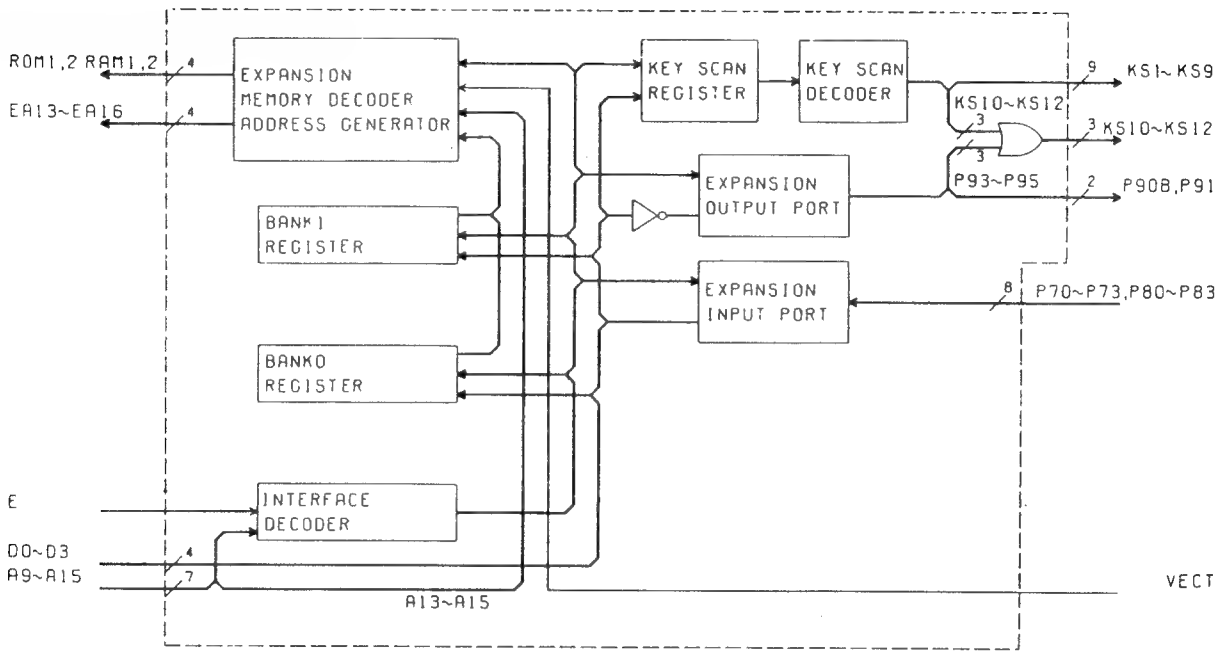
*Note Program Area is located in IC5 (32K byte ROM) or bottom 32K byte in IC6 (128K byte ROM). The selection is determined by the status of the VECT pin on the Gate Array IC2 Pin 46.

| (IC5) ROM | Installed | Not Installed |
|---|---|---|
| Program | IC5 | IC6<br>Bottom 32K byte |
| VECT<br>(IC2) Pin 46 | +5 V | 0 V |

### 4.3.4 Gate Array

The Gate Array (IC2) is an original LSI which integrates complex circuits into 1 chip IC. Basically the Gate Array consists of 8 circuits. The key scan register, the key scan decoder and the expansion input port are used to sense the key data and slide switch positions. The expansion memory decoder, BANK 0 register and BANK 1 register are used to access expansion memory area (IC6). The expansion output port is a 5 bit output port which is used for the RAM enable signal and shift lock and TEXT LEDs. The interface decoder is used to access other block circuits in the Gate Array.

**Gate Array (IC2) Block Diagram**




### 4.3.5 Memory Select

The Gate Array (IC2) has 4 memory select signal outputs for ROM1, 2 and RAM1, 2. This typewriter uses ROM1, 2 and RAM1. The memory select output signal is generated by the expansion memory decoder and the address generator which decode the address signals. When the CPU selects a memory chip, a low (L) active pulse signal is generated by the decoder then read or write is accomplished.

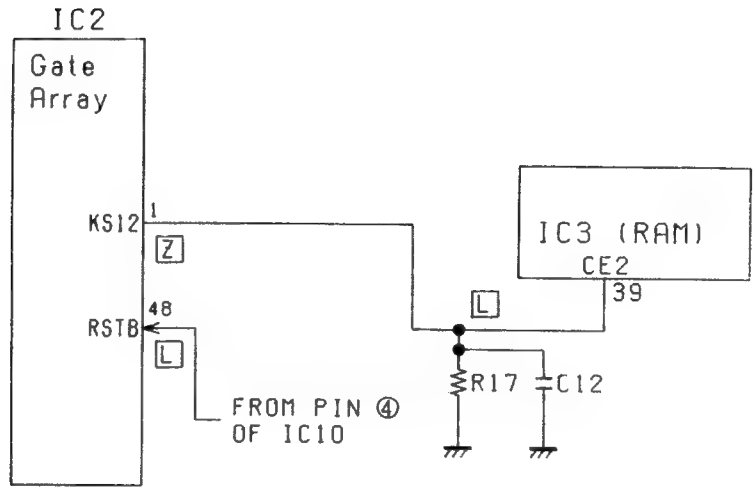
### 4.3.6 Gate Array Pin Function

The Gate Array pin functions are shown in the following chart.

| NAME | FUNCTION | | | NAME | FUNCTION |
|---|---|---|---|---|---|
| KS12 | RAM Enable Signal | ← | 1 | RSTB | RESET |
| KS11 | NC | ← | 2 | P91 | Shift Lock LED |
| KS10 | | ← | 3 | VECT | VECTOR |
| P80 | Key Data Input | → | 4 | VDD | +5 V |
| P81 | | → | 5 | LCDE | NC |
| P82 | | → | 6 | AD15 | Address Bus |
| P83 | | → | 7 | AD14 | |
| P90B | TEXT LED | ← | 8 | AD13 | |
| P70 | Key Data Input | → | 9 | EA16 | Expansion Address Bus |
| P71 | | → | 10 | EA17 | |
| P72 | | → | 11 | EA15 | |
| P73 | | → | 12 | AD12 | Address Bus |
| KS6 | Key Scan Output With Open Drain | ← | 13 | EA14 | Expansion Address Bus |
| KS5 | | ← | 14 | EA13 | |
| KS4 | | ← | 15 | AD9 | Address Bus |
| KS3 | | ← | 16 | AD11 | |
| KS2 | | ← | 17 | AD10 | |
| KS1 | | ← | 18 | ROM1 | IC6 Chip Select |
| KS7 | | ← | 19 | DB0 | Data Bus |
| KS8 | | ← | 20 | DB1 | |
| KS9 | | ← | 21 | DB2 | |
| RAM1 | IC3 Chip select | ← | 22 | DB3 | |
| ROM2 | IC5 Chip Select | ← | 23 | RAM2 | NC |
| GND | Ground (0 V) | | 24 | E | E Clock |

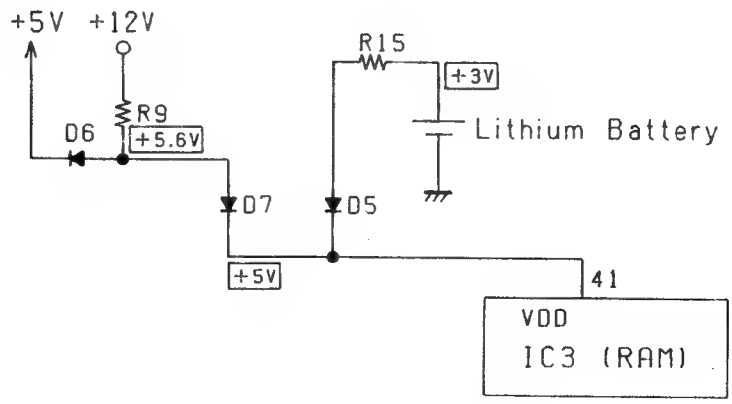
### 4.3.7 Memory Protection Circuit

The circuit prevents writing data to the RAM chips when the Unit is turned on or off and while the memory retention is in the backup mode. When the reset signal (L level) is provided to IC2 (Gate Array), pin 1 (KS12) of IC2 is turned to high impedance from H level. Thus the RAM CE2 terminal becomes L level by R17, and the RAM data can not be accessed by the CPU thus protecting the memory.
When the reset signal becomes H level from L level, the pin 1 of the Gate Array is turned to H level by the software, and the RAM data can be accessed by the CPU.




### 4.3.8 Memory Backup Circuit

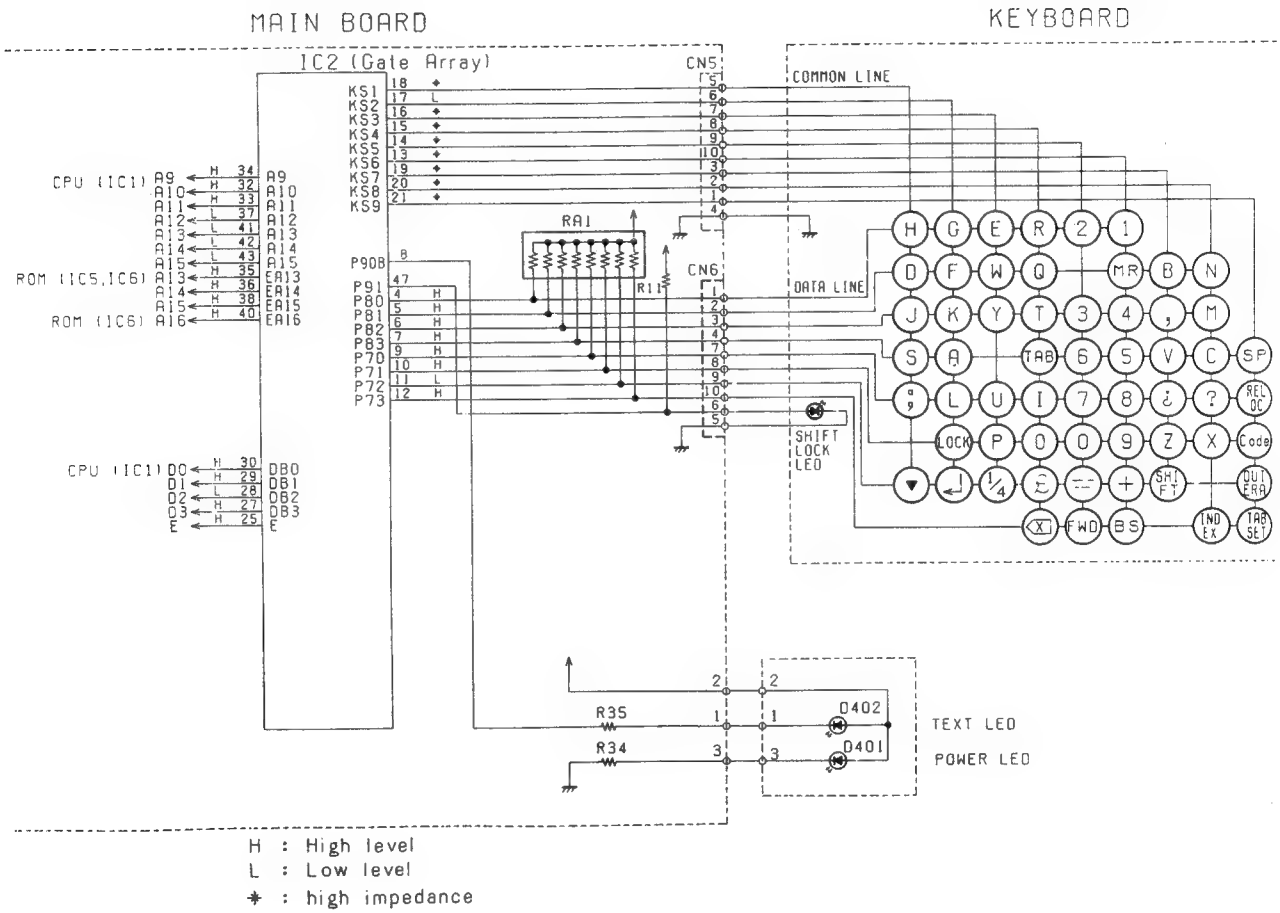
The circuit contains the lithium battery used to back up the text memory and the margin format. In normal condition, the power is supplied to the RAM from the +12 V power source to maintain the memory. When the voltage at the cathode of D7 becomes lower than +3 V, because of either the power switch or accidental power interruption, the lithium battery starts supplying about +3 V 1μA to the RAM VDD terminals (IC3) through R15 and D5 to maintain the memory.




**Voltage Condition: At standby condition**

## 4.4 Keyboard Matrix Circuit

The matrix circuit is composed of a key scan register, a key scan decoder and an 8 bit expansion input port which are located in the Gate Array (IC2), the keyboard and the function switch board. KS1-KS9 are connected to the keyboard switches and KS9-KS11 are connected to the function switches which are composed of 4 slide switches and 4 push switches. When one of the scanning output (KS1-KS9) lines in the scanning decoder is turned from high impedance to Low level, the data of the key which is connected to the selected scanning line, is sent to the CPU through the expansion input port and data bus (D0-D3). The scanning output line (KS1-KS9) which is turned to Low level is determined by data written into the key scan register by the CPU. The CPU then reads the 4 bit key data from P70-P73 (address 0E00) or P80-P83 (address 1000). The CPU can sense all data about every 20 msec. For example, when the CPU reads address 0E00 after writing data "02" to the key scan register and the RETURN key is pushed, the voltages are as shown in the following Schematic.



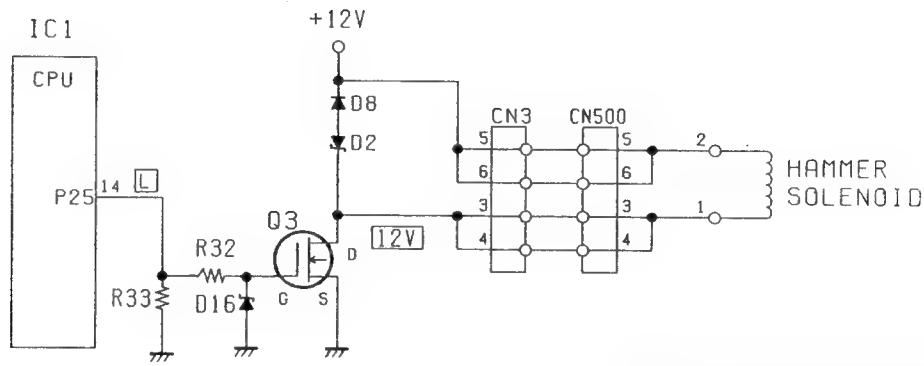
## 4.5 Drive Circuit

### 4.5.1 Print Hammer Drive Circuit

When energized the plunger of the hammer solenoid strikes the print hammer, which in turn impacts a spoke on the daisywheel and prints a character. The amount of impact force is controlled by the software.
Each character on the daisywheel has a different surface area, requiring a different impact for proper print. For example, a capital "W" has a large surface area, requiring a heavier impact to print correctly. A period ".", however, requires much less impact to obtain the same impression. When a "W" is typed it is given a longer impact time than a ".". In this way each character has its own defined impact duration, providing an even impression level.

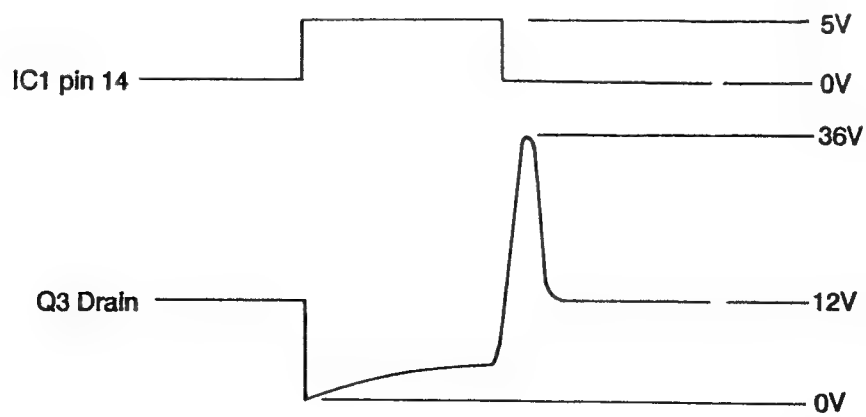
The print hammer drive circuit mainly consists of Q3, D2 and D8. The CPU (IC1) generates a signal for a specific amount of time. When the P25 of IC1 is turned to H level from L level, Q3 is turned on, activating the hammer solenoid. The current through the hammer solenoid is fixed at about 4 amps.

**Schematic Diagram**




**Voltage Condition: At standby condition**

**Timing Chart**



### 4.5.2 DC Motor Drive and Sensor Circuit

Paper feed and ribbon feed motors are +12 V bi-directional DC motors, controlled by IC9, which is able to drive two motors at different times. The driving motor (paper feed or ribbon feed) is selected by the signal received from Port 65 and 66 of CPU (IC1) and the direction of motor rotation (index or reverse index) is dependent on the signal received from Port 67 of IC1, as indicated in the truth table.

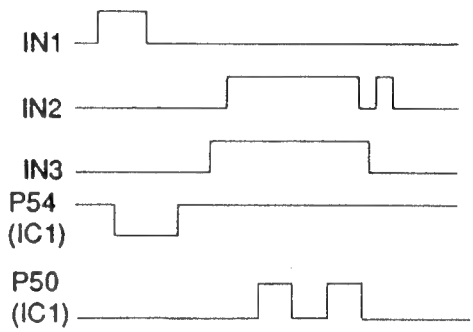
SW501 (ribbon feed sensor) is used to monitor the position of the drive cam by detecting the position of a magnet mounted on the Gear.

SW502 (paper feed sensor/carrier home sensor) is used to monitor the position of the intermediate gear by a cam mounted on the gear. And also SW502 is used to detect the carrier home position, when the power switch is turned on.

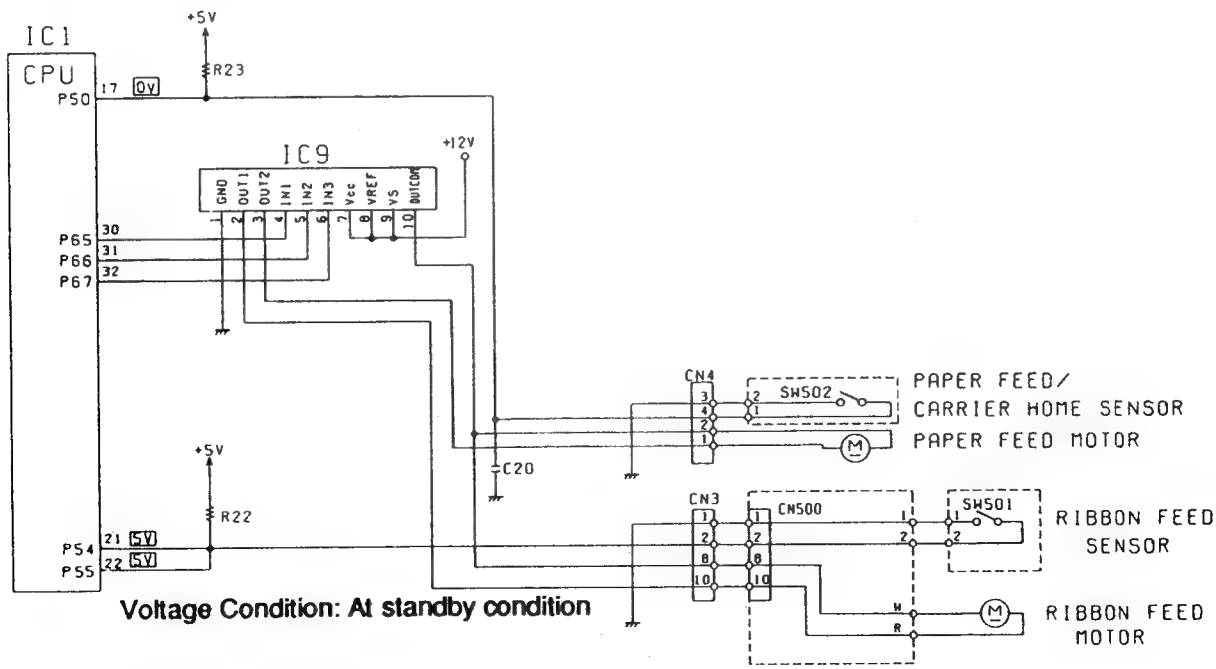
**Truth Table**

| Input | | | Output | | | Function | |
|---|---|---|---|---|---|---|---|
| IN1 | IN2 | IN3 | OUT1 | OUT COM | OUT2 | Ribbon Feed Motor Output OUT1, OUT COM | Paper Feed Motor Output OUT2, OUT COM |
| 0 | 0 | 0 | 0 | 0 | 0 | Braking | Braking |
| 0 | 0 | 1 | 0 | 0 | 0 | Braking | Braking |
| 0 | 1 | 0 | OFF | 1 | 0 | Open | ↻ CW |
| 0 | 1 | 1 | OFF | 0 | 1 | Open | ↺ CCW |
| 1 | 0 | 0 | 0 | 1 | OFF | ↻ CW | Open |
| 1 | 0 | 1 | 1 | 0 | OFF | ↺ CCW | Open |
| 1 | 1 | 0 | 0 | 0 | 0 | Braking | Braking |
| 1 | 1 | 1 | 0 | 0 | 0 | Braking | Braking |

**Timing Chart**




**Schematic Diagram**



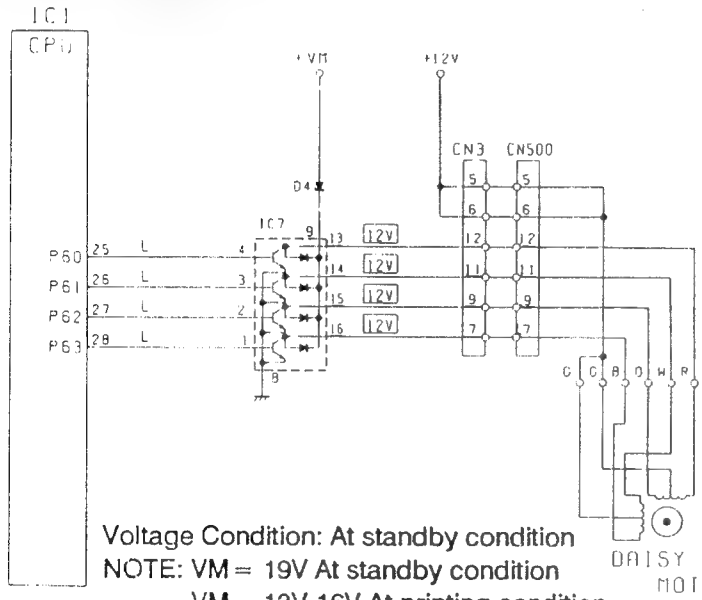
### 4.5.3 Daisywheel Motor and Carrier Spacing Motor Drive Circuit

The daisywheel motor and the carrier spacing motor are four-phase uni-polar PM type stepping motors. The stepping signal of the carrier spacing motor originates at P20, P21, P22 and P23 of IC1. The stepping signal of the daisywheel motor originates at P60, P61, P62 and P63 of IC1. These signals are sent to the transistor array IC8 and IC7.

A step/hold control line, supplied by P24 of IC1 controls the amount of current supplied to the motor while it is stepping or holding. When P24 of IC1 is Low, +VM is supplied through R25, R30 and R31 giving the motor less current while it is holding. When P24 of IC1 is High, +VM is supplied through Q2 ,R30 and R31 giving the motor extra current needed for stepping.

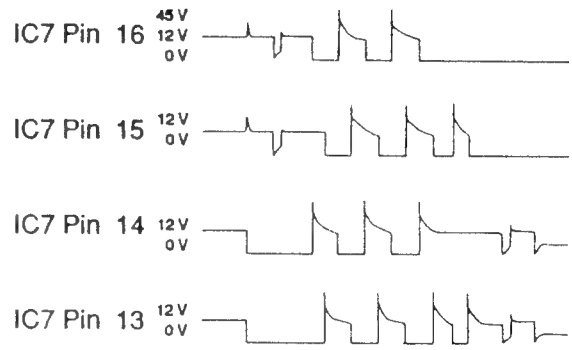
The daisywheel motor drive circuit does not have a voltage control circuit.

**Daisywheel Motor Drive Circuit**

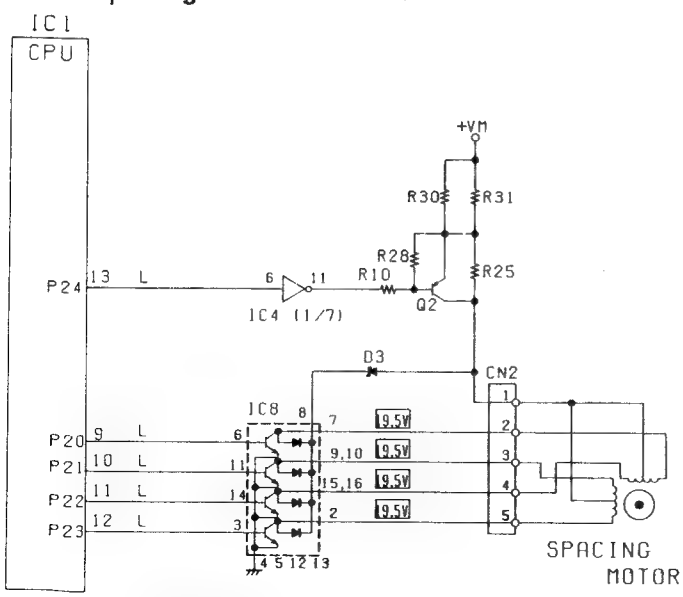



Voltage Condition: At standby condition
NOTE: VM = 19V At standby condition
VM = 13V-16V At printing condition

**Timing Chart**

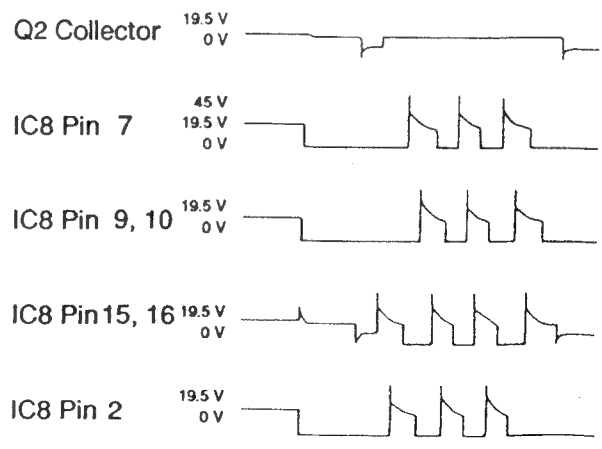



**Carrier Spacing Motor Drive Circuit**



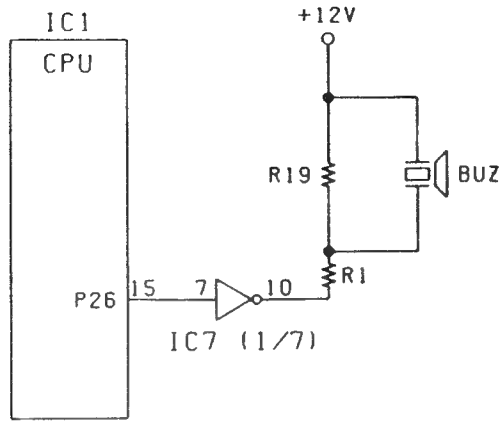

Voltage Condition: At standby condition
NOTE: VM = 19V At standby condition
VM = 13V-16V At printing condition

**Timing Chart**



### 4.5.4 Buzzer Circuit

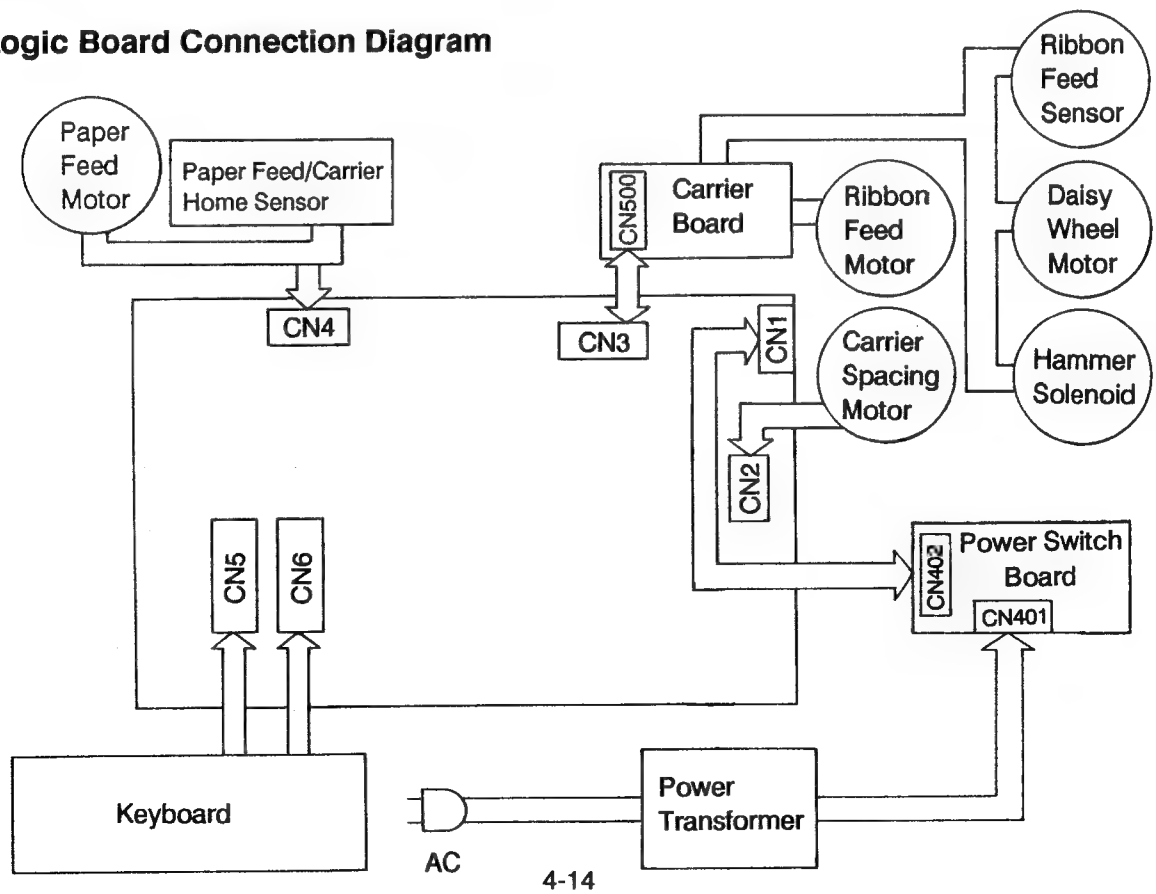
The Buzzer receives a signal (about 2.3 kHz) from Port 26 (Pin 15) of IC1 which turns on or off IC7 (IN Pin 7, OUT Pin 10), driving the buzzer.




The Buzzer is mounted on the Logic Board and sounds under the following circumstances:

1) Sound of "A"
   a) Carrier enters Hot Zone.
   b) Depressing valid function key.
2) Sound of "B"
   a) Depressing invalid function key.
   b) Carrier reaches right margin.
2) Sound of "C"
   a) Incorrect spelling is found.

## 4.6 Logic Board Connection Diagram



## 4.7 Explanation of Connectors

### CN1 Power Switch Connector

| Pin No. | Signal Name | Color of Lead | |
|---|---|---|---|
| 1 | AC16 V | White | For Electric Circuit |
| 2 | AC16 V | Red | For Electric Circuit |

### CN2 Carrier Spacing Motor Connector

| Pin No. | Signal Name | Description of Signal | Direction |
|---|---|---|---|
| 1 | SCR | Carrier Spacing Motor Power Supply | Out |
| 2 | CRA | Phase A for Carrier Spacing Motor Drive | Out |
| 3 | CRB | Phase B for Carrier Spacing Motor Drive | Out |
| 4 | $\overline{\text{CRA}}$ | Phase $\overline{\text{A}}$ for Carrier Spacing Motor Drive | Out |
| 5 | $\overline{\text{CRB}}$ | Phase $\overline{\text{B}}$ for Carrier Spacing Motor Drive | Out |

### CN3 Carrier Connector

| Pin No. | Signal Name | Description of Signal | Direction |
|---|---|---|---|
| 1 | GND | Ground | — |
| 2 | RBS | Ribbon Sensor | In |
| 3 | HSE | Hammer Solenoid Enable | Out |
| 4 | HSE | | |
| 5 | +12 V | +12 V | Out |
| 6 | +12 V | | |
| 7 | DSA | Phase A for Daisywheel Motor Drive | Out |
| 8 | RBP | Phase (+) of Ribbon Feed Motor | Out |
| 9 | DSB | Phase B for Daisywheel Motor Drive | Out |
| 10 | RBN | Phase (--) of Ribbon Feed Motor | Out |
| 11 | $\overline{\text{DSA}}$ | Phase $\overline{\text{A}}$ for Daisywheel Motor Drive | Out |
| 12 | $\overline{\text{DSB}}$ | Phase $\overline{\text{B}}$ for Daisywheel Motor Drive | Out |

### CN4 Sensor Connector

| Pin No. | Signal Name | Description of Signal | Direction |
|---|---|---|---|
| 1 | LFN | Phase (--) of Paper Feed Motor | Out |
| 2 | LFP | Phase (+) of Paper Feed Motor | Out |
| 3 | GND | Ground | — |
| 4 | LFS | LF/Carrier Sensor | In |

### CN5 Keyboard Connector 1

| Pin No. | Signal Name | Description of Signal | Direction |
|---|---|---|---|
| 1 | KS9 | Key Strobe | Out |
| 2 | KS8 | | |
| 3 | KS7 | | |
| 4 | GND | Ground | — |
| 5 | KS1 | Key Strobe | Out |
| 6 | KS2 | | |
| 7 | KS3 | | |
| 8 | KS4 | | |
| 9 | KS5 | | |
| 10 | KS6 | | |

### CN6 Keyboard Connector 2

| Pin No. | Signal Name | Description of Signal | Direction |
|---|---|---|---|
| 1 | P80 | Key Data | In |
| 2 | P81 | | |
| 3 | P82 | | |
| 4 | P83 | | |
| 5 | GND | Ground | — |
| 6 | LED | Shift Lock LED | Out |
| 7 | P70 | Key Data | In |
| 8 | P71 | | |
| 9 | P72 | | |
| 10 | P73 | | |

**CN401 Power Transformer Connector**

| Pin No. | Signal Name | Color of Lead | |
|---|---|---|---|
| 1 | AC16 V | Red | For Electric Circuit |
| 2 | AC16 V | Red | For Electric Circuit |

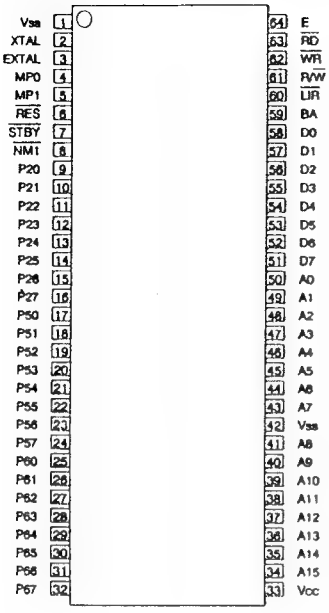
**CN402 Power Switch Connector**

| Pin No. | Signal Name | Color of Lead | |
|---|---|---|---|
| 1 | AC16 V | White | For Electric Circuit |
| 2 | N. C. | — | Not connected |
| 3 | AC16 V | Red | For Electric Circuit |

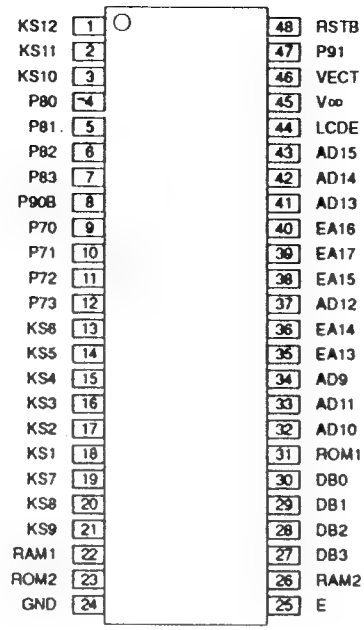
**CN500 Carrier Connector**

| Pin No. | Signal Name | Description of Signal | Direction |
|---|---|---|---|
| 1 | GND | Ground | In |
| 2 | RBS | Ribbon Sensor | — |
| 3 | HSE | Hammer Solenoid Enable | Out |
| 4 | HSE | | |
| 5 | +12 V | +12 V | Out |
| 6 | +12 V | | |
| 7 | DSA | Phase A for Daisywheel Motor Drive | Out |
| 8 | RBP | Phase (+) of Ribbon Feed Motor | Out |
| 9 | DSB | Phase B for Daisywheel Motor Drive | Out |
| 10 | RBN | Phase (-) of Ribbon Feed Motor | Out |
| 11 | $\overline{\text{DSA}}$ | Phase $\overline{\text{A}}$ for Daisywheel Motor Drive | Out |
| 12 | $\overline{\text{DSB}}$ | Phase $\overline{\text{B}}$ for Daisywheel Motor Drive | Out |

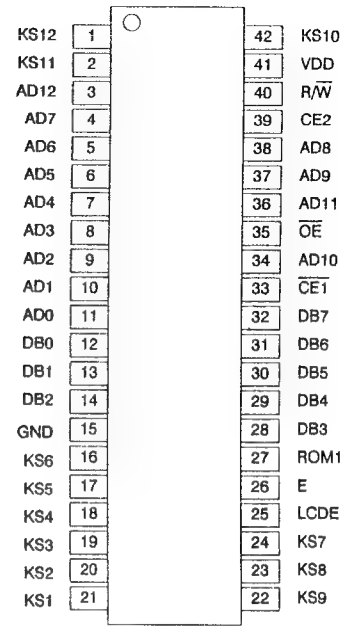
## 4.8 Component Reference Guide



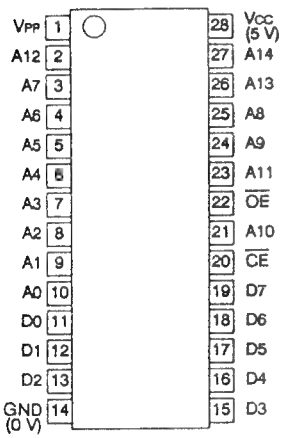

HD63B03X
(IC1)



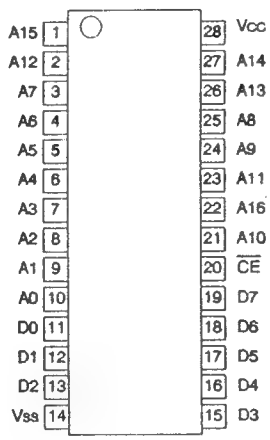

M7032H
(IC2)



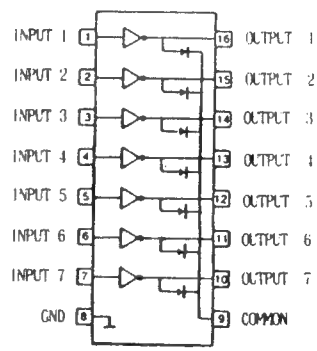

M6364MA
(IC3)



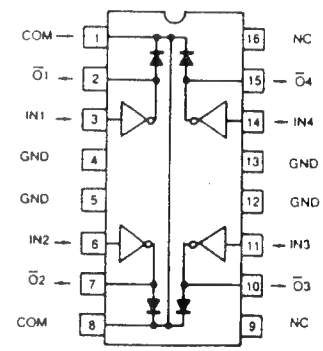

1R520M
(IC5)



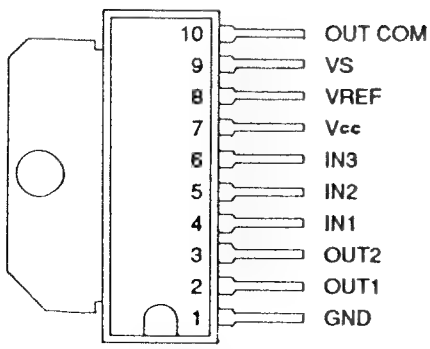

2R520M R520M
(IC6)



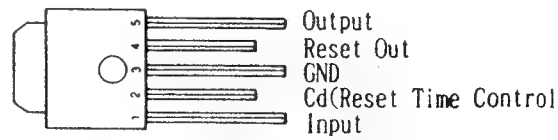

BA12003
(IC7)




M54532P
(IC8)



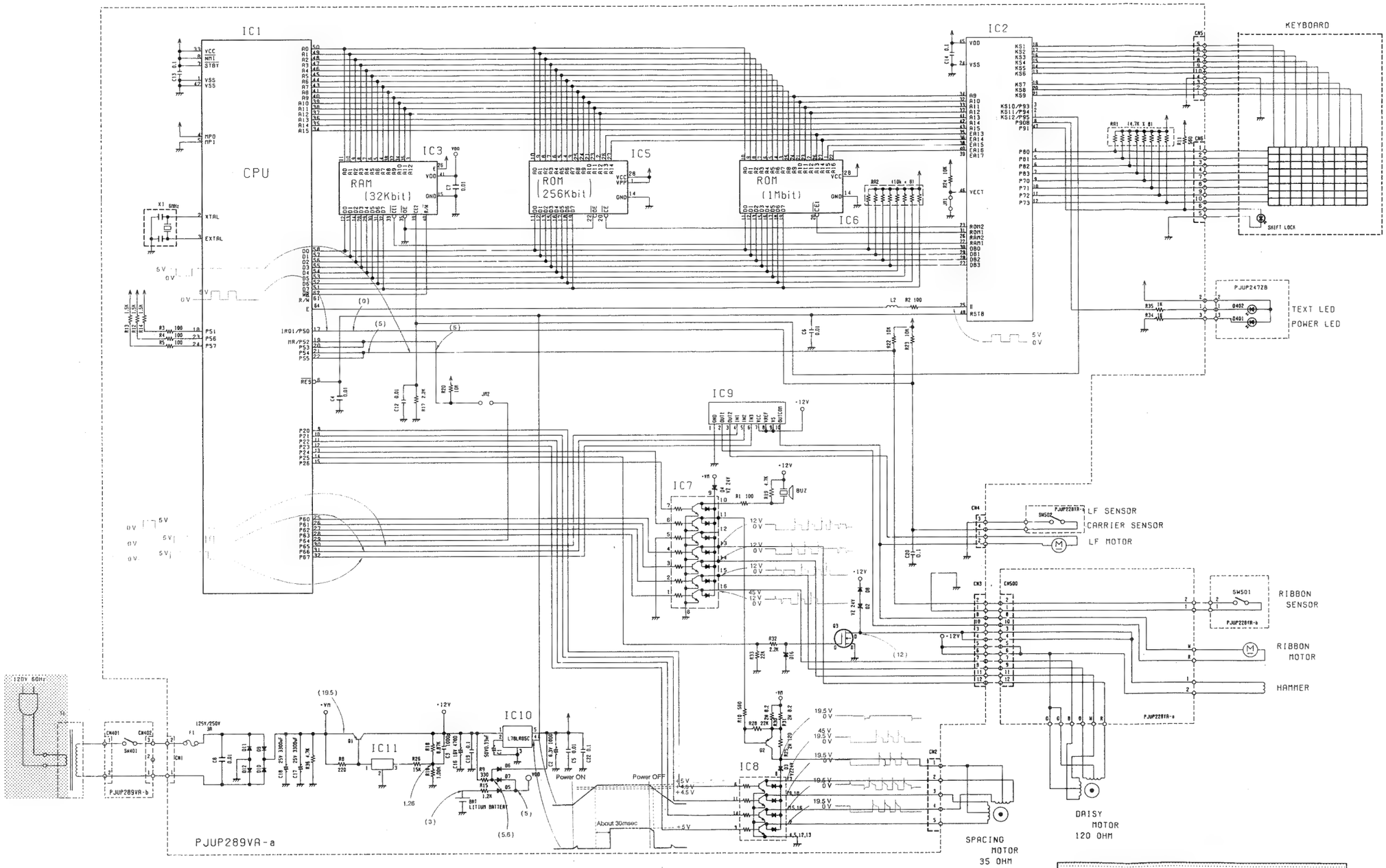

TA7288P
(IC9)




L78LR05C
(IC10)


M5236L
(IC11)

## 4.9 Logic Board Schematic




Note: The voltage are measured in "Self Print" mode.
( ): Standby condition

NOTE

VM: +19V AT STAND-BY CONDITION
+13 → 16V AT PRINTING CONDITION

VDD: +5V AT POWER ON CONDITION
+3V AT POWER OFF CONDITION

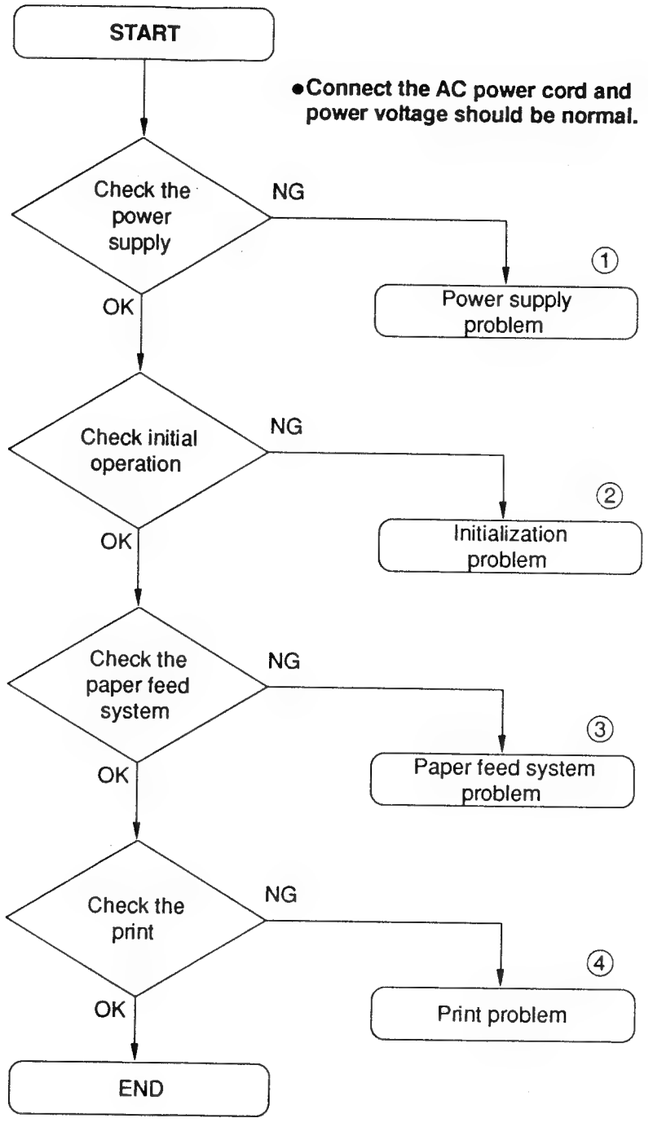
↑: +5V

JM1: ROM SELECT TERMINAL
WHEN JM1 IS OPENED, IC5 IS REQUIRED FOR OPERATING.

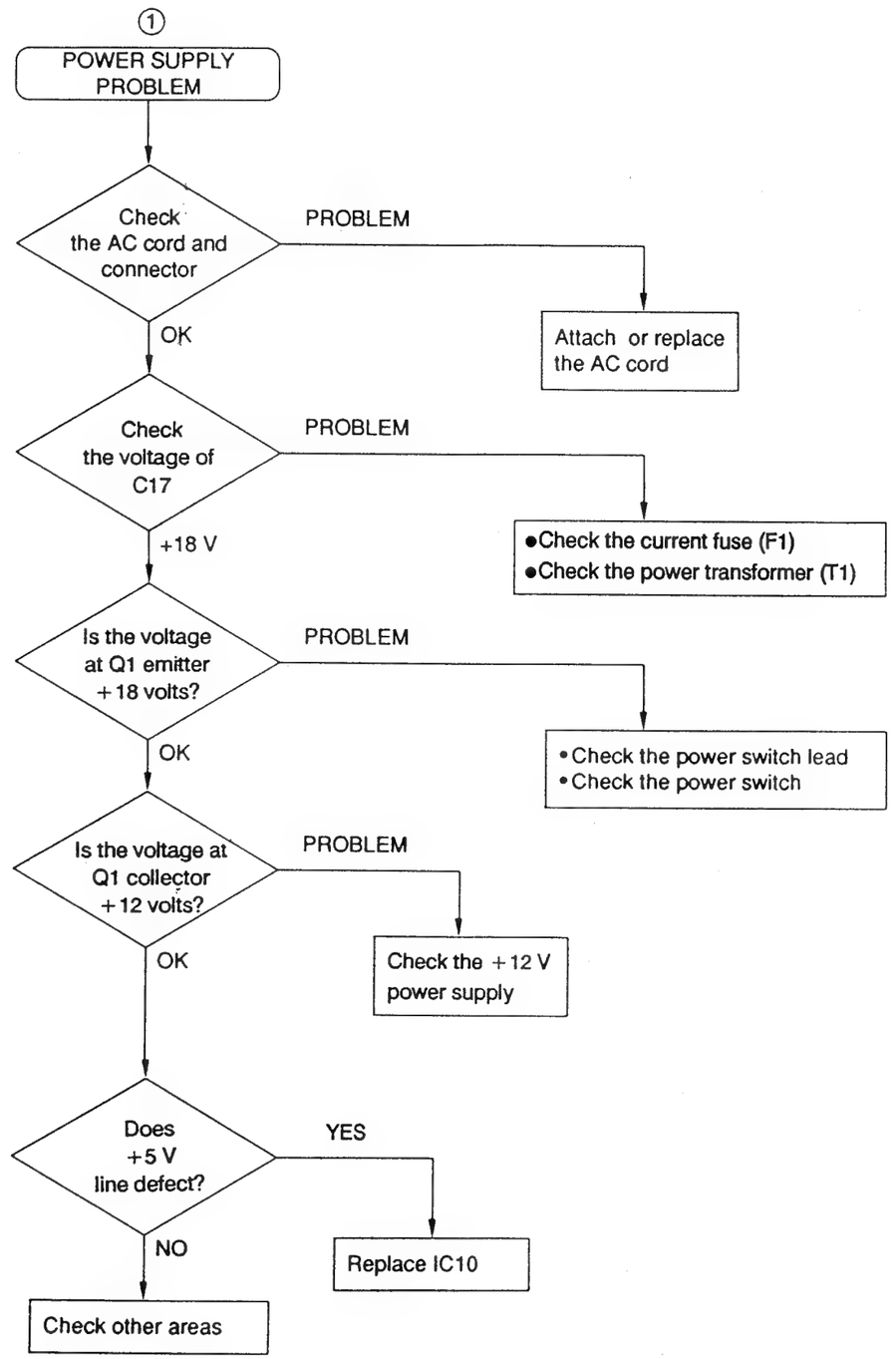
**Important safety notice:**

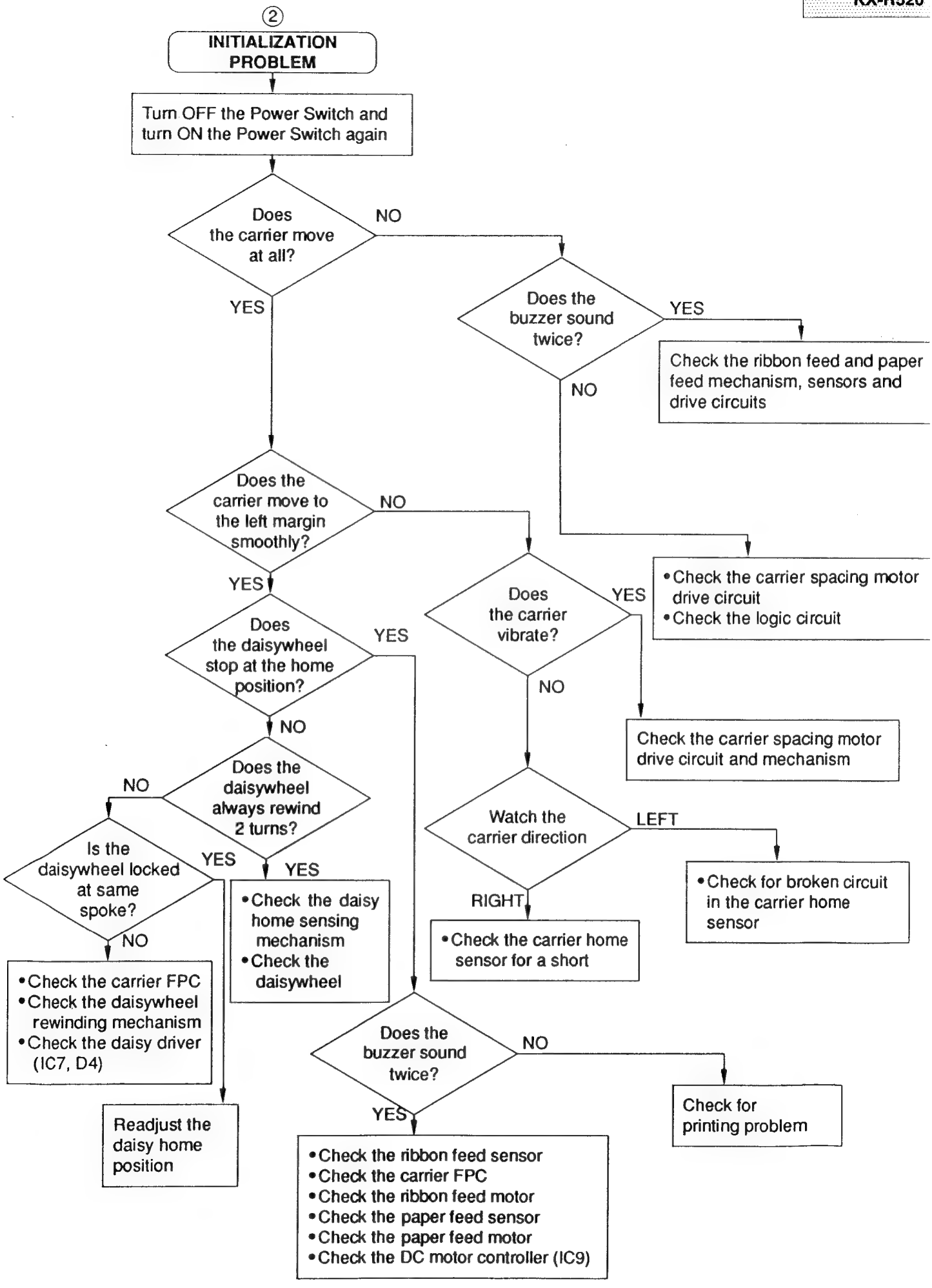
The shaded area on this schematic diagram incorporates special features important for protection from fire and electrical shock hazards. When servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

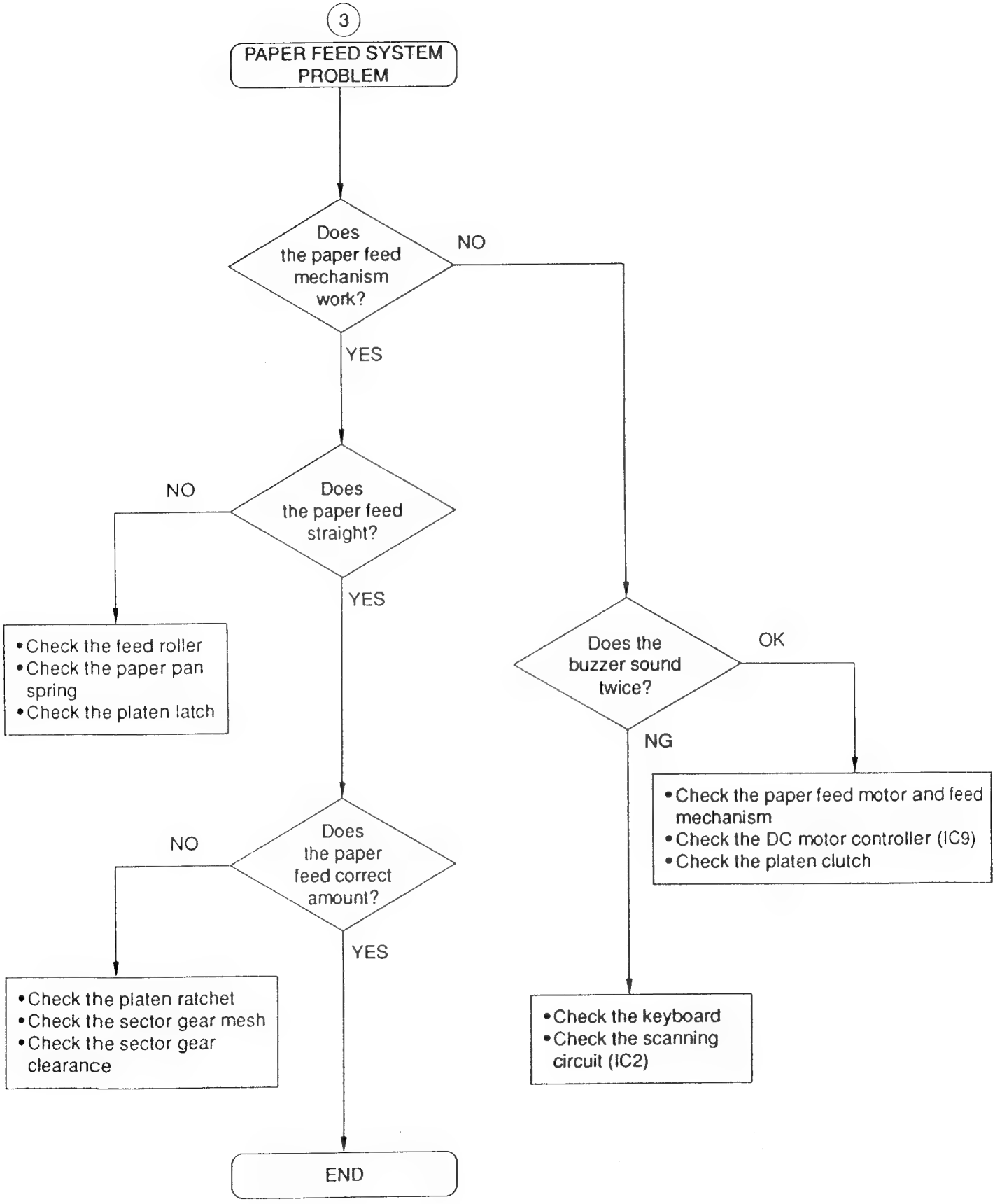
## 4.10 Flow Chart

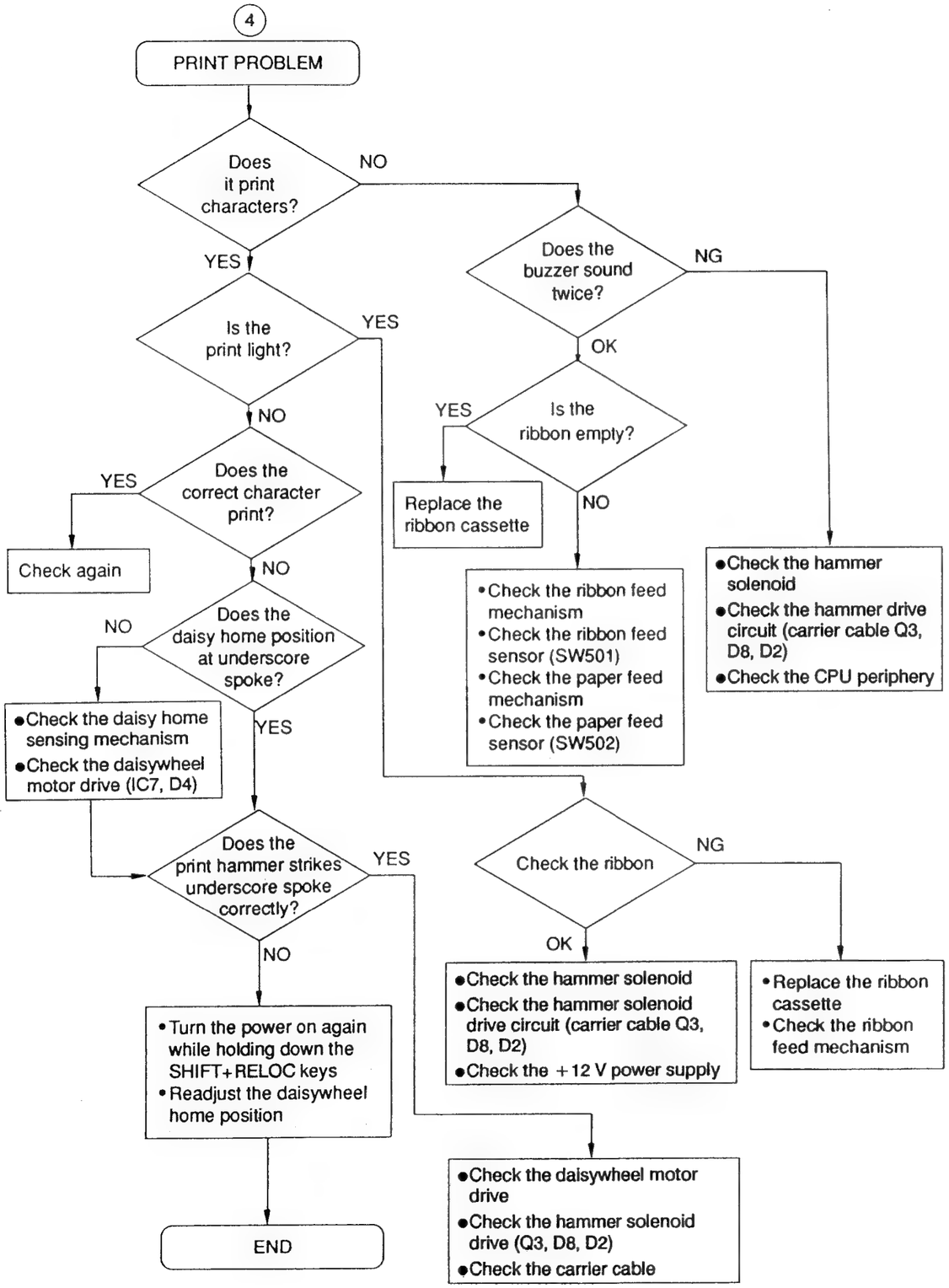





②
INITIALIZATION PROBLEM
Turn OFF the Power Switch and turn ON the Power Switch again
Does the carrier move at all?
NO
YES
Does the buzzer sound twice?
YES
Check the ribbon feed and paper feed mechanism, sensors and drive circuits
NO
Does the carrier move to the left margin smoothly?
NO
YES
Does the carrier vibrate?
YES
• Check the carrier spacing motor drive circuit
• Check the logic circuit
NO
Does the daisywheel stop at the home position?
YES
NO
Check the carrier spacing motor drive circuit and mechanism
Does the daisywheel always rewind 2 turns?
NO
YES
Watch the carrier direction
LEFT
RIGHT
• Check for broken circuit in the carrier home sensor
• Check the carrier home sensor for a short
Is the daisywheel locked at same spoke?
YES
NO
YES
• Check the daisy home sensing mechanism
• Check the daisywheel
• Check the carrier FPC
• Check the daisywheel rewinding mechanism
• Check the daisy driver (IC7, D4)
Readjust the daisy home position
Does the buzzer sound twice?
NO
YES
Check for printing problem
• Check the ribbon feed sensor
• Check the carrier FPC
• Check the ribbon feed motor
• Check the paper feed sensor
• Check the paper feed motor
• Check the DC motor controller (IC9)


3
PAPER FEED SYSTEM PROBLEM
Does the paper feed mechanism work?
NO
YES
Does the paper feed straight?
NO
YES
• Check the feed roller
• Check the paper pan spring
• Check the platen latch
Does the paper feed correct amount?
NO
YES
• Check the platen ratchet
• Check the sector gear mesh
• Check the sector gear clearance
END
Does the buzzer sound twice?
OK
NG
• Check the paper feed motor and feed mechanism
• Check the DC motor controller (IC9)
• Check the platen clutch
• Check the keyboard
• Check the scanning circuit (IC2)

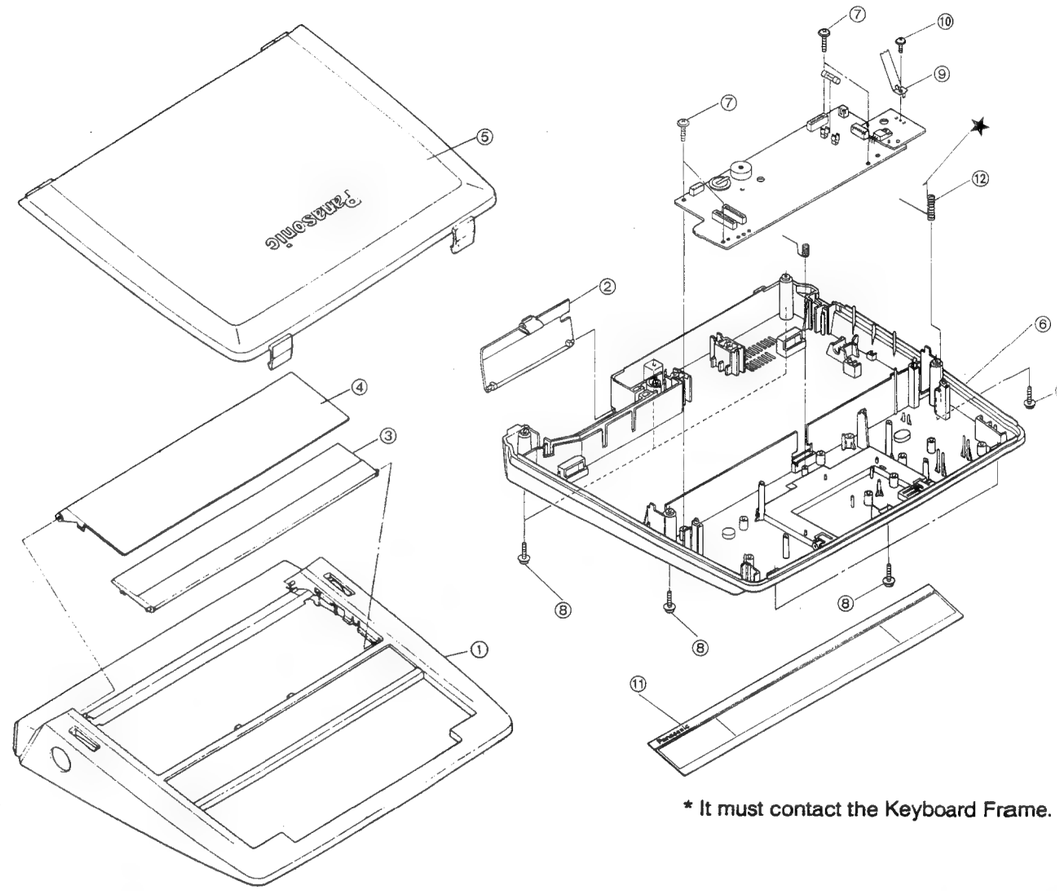





## 5. Parts Catalog and Lubrication Points

NOTES: 1. Important safety notice.
Components identified by ⚠ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.
2. The S mark is for service standard parts and may differ from production parts.
3. The * mark designates parts available during the production period only.

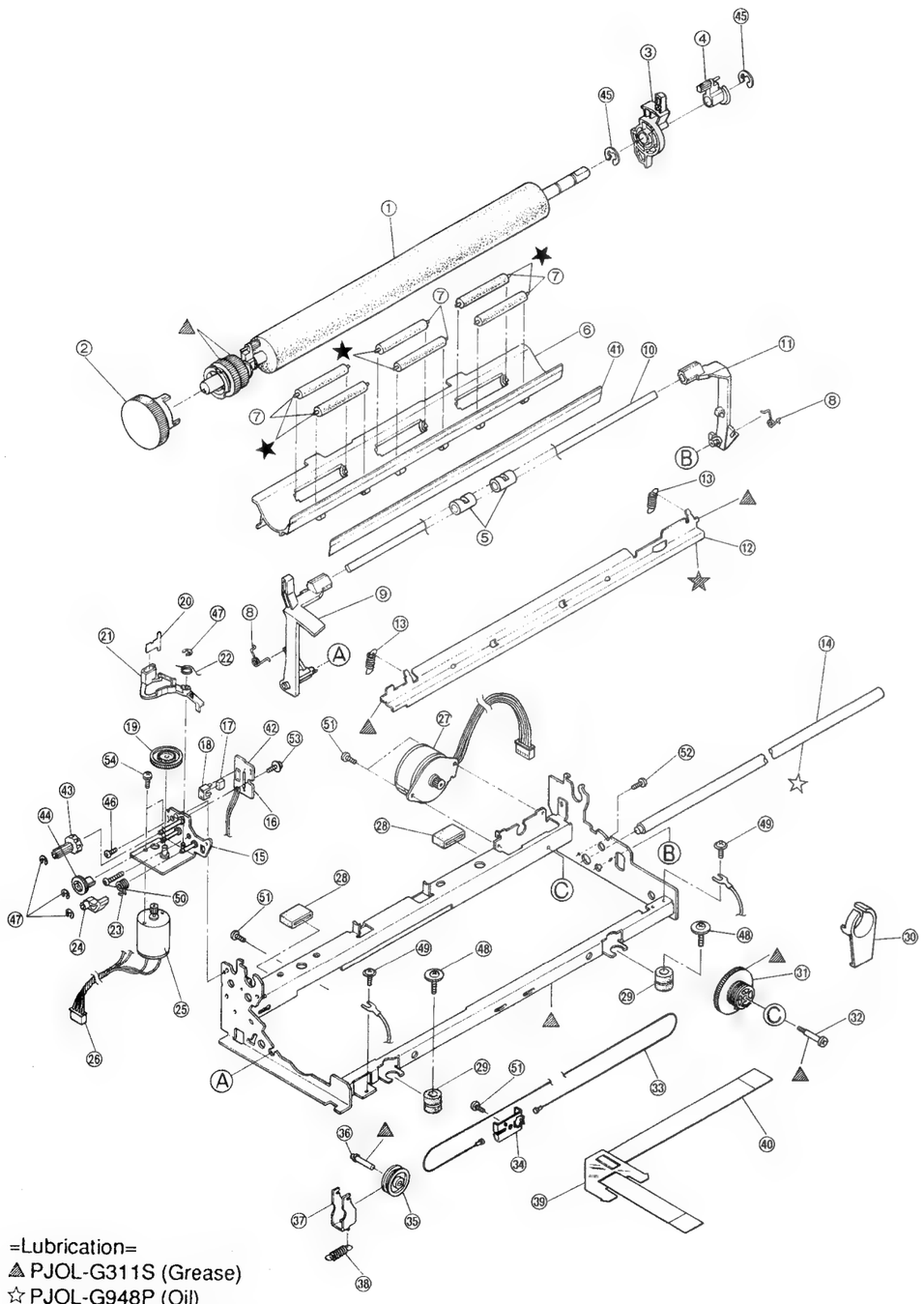
### 1. Covers




* It must contact the Keyboard Frame.

| Ref. No. | Parts No. | Parts Name and Description | Per Set | Remarks |
|---|---|---|---|---|
| 1-1 | PJKF35T | Upper Cover | 1 | |
| 1-2 | PJKE73Z | AC Cord Cover | 1 | |
| 1-3 | PJKK53W | Front Cover | 1 | |
| 1-4 | PJKE72Z | Paper Stand | 1 | |
| 1-5 | PJKK9016Z | Hard Cover | 1 | |
| 1-6 | PJYMR520M | Bottom Cover Assembly | 1 | |
| 1-7 | XTW3+10S | Screw 3×10 mm | 4 | |
| 1-8 | XTW3+14SFZ | Screw 3×14 mm | 8 | |
| 1-9 | PJUS94Y | FG Plate | 1 | |
| 1-10 | XTW26+6F | Screw 2.6×6 mm | 1 | |
| 1-11 | PJGP171Z | Control Panel | 1 | |
| 1-12 | PJDS7055Z | FG Spring | 1 | |

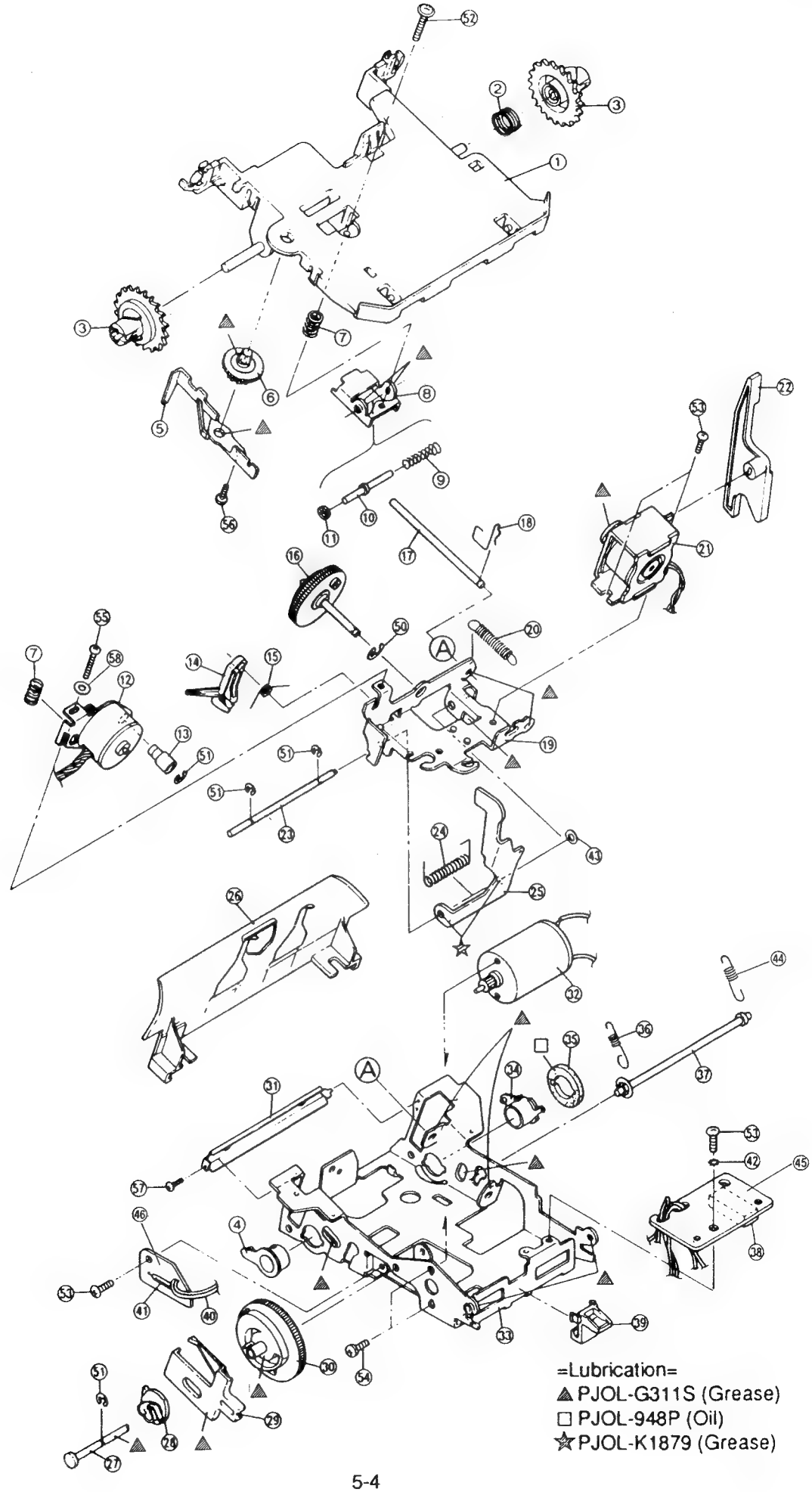
## 2. Chassis and Platen



=Lubrication=
▲ PJOL-G311S (Grease)
☆ PJOL-G948P (Oil)
★ PJOL-K1879 (Grease)
★ PJOL-SG3451 (Grease)

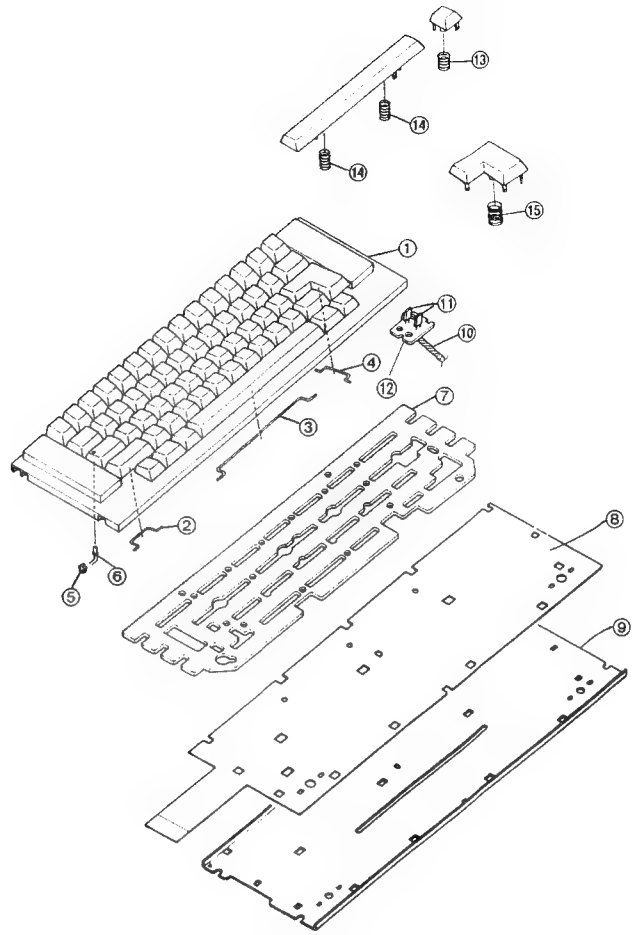
| Ref. No. | Parts No. | Parts Name and Description | Per Set | Remarks |
|---|---|---|---|---|
| 2-1 | PJZRR520M | Platen Assembly | 1 | |
| 2-2 | PJBN20Z | Platen Knob (L) | 1 | |
| 2-3 | PJUB65Z | Paper Release Lever | 1 | |
| 2-4 | PJDJ08261RZ | Platen Bushing (R) | 1 | |
| 2-5 | PJZR2XR250M | Bail Roller Kit | 2 | |
| 2-6 | PJZH1XR310M | Paper Pan Assembly | 1 | |
| 2-7 | PJDR37Z | Feed Roller | 6 | |
| 2-8 | PJDS7018Z | Spring, Bail Lever | 2 | |
| 2-9 | PJUB64Z | Bail Lever (L) | 1 | |
| 2-10 | PJDF955Z | Bail Shaft | 1 | |
| 2-11 | PJUB61Z | Bail Lever (R) | 1 | |
| 2-12 | PJUL77Z | Paper Release Plate | 1 | |
| 2-13 | PJDS5108Z | Spring, Paper Release | 2 | |
| 2-14 | PJDF552Z | Carrier Shaft | 1 | |
| 2-15 | PJZHR520M | Paper Feed Motor Bracket Assembly | 1 | |
| 2-16 | PJVSFR1Z | Reed Switch (SW502) | 1 | |
| 2-17 | PJHE028Z | Magnet | 1 | |
| 2-18 | PJHR9109Z | Magnet Holder | 1 | |
| 2-19 | PJDG50161Z | Paper Feed Cam Gear | 1 | |
| 2-20 | PJMC68Z | Magnetic Shutter | 1 | |
| 2-21 | PJHR549Z | Home Detecting Lever | 1 | |
| 2-22 | PJDS7016Z | Spring, Home Detecting Lever | 1 | |
| 2-23 | PJDS7015Z | Spring, Detent | 1 | |
| 2-24 | PJDE91Z | Detent, Lever | 1 | |
| 2-25 | PJWQ3R520M | Paper Feed Motor Assembly | 1 | |
| 2-26 | PJJS437Z | Paper Feed Motor Lead | 1 | |
| 2-27 | PJJQ83Y | Carrier Spacing Motor | 1 | |
| 2-28 | PJHG947Z | Mount Rubber, Rear | 2 | |
| 2-29 | PJHG932Z | Mount Rubber, Front | 2 | |
| 2-30 | PJZXXR250M | Gear Cup (Jig) | 1 | |
| 2-31 | PJDD3191Z | Drum Gear | 1 | |
| 2-32 | PJHE5040Z | Drum Gear Shaft | 1 | |
| 2-33 | PJDZ25Z | Carrier Cable | 1 | |
| 2-34 | PJUL78Z | Cable Hanger | 1 | |
| 2-35 | PJDR35Z | Tension Pulley | 1 | |
| 2-36 | PJDY137Z | Tension Pulley Shaft | 1 | |
| 2-37 | PJUL76Z | Tension Arm | 1 | |
| 2-38 | PJDS5164Z | Tension Spring | 1 | |
| 2-39 | PJHR551Z | Cable Holder | 1 | |
| 2-40 | PJJE109Z | Flat Cable | 1 | |
| 2-41 | PJHR533Z | Guide, Paper Feed | 1 | |
| 2-42 | PJUP228Y-C | L.F. Sensor Bare PCB | 1 | |
| 2-43 | PJDG50162Z | Geneba Gear | 1 | |
| 2-44 | PJDG50160Z | Primary Gear | 1 | |
| 2-45 | XUC7FY | E-ring | 2 | |
| 2-46 | XTS3+8F | Screw 3×8 mm | 1 | |
| 2-47 | XUC2FY | E-ring | 4 | |
| 2-48 | PJHE5057Z | Screw 3×12 mm | 2 | |
| 2-49 | XTW3+6L | Screw 3×6 mm | 2 | |
| 2-50 | XTS3+13F | Screw 3×13 mm | 1 | |
| 2-51 | XTN3+6F | Screw 3×6 mm | 3 | |
| 2-52 | XTW3+U6L | Screw 3×6 mm | 1 | |
| 2-53 | XTW3+5L | Screw 3×5 mm | 1 | |
| 2-54 | XYN3+C4 | Screw 3×4 mm | 2 | |

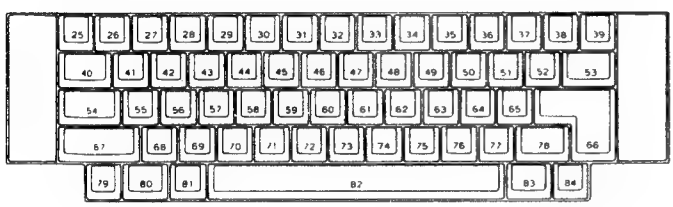
## 3. Carrier


=Lubrication=
▲ PJOL-G311S (Grease)
□ PJOL-948P (Oil)
☆ PJOL-K1879 (Grease)

| Ref. No. | Parts No. | Parts Name and Description | Per Set | Remarks |
|---|---|---|---|---|
| 3-1 | PJZUXR340M | Ribbon Holder Assembly | 1 | |
| 3-2 | PJDS7005Y | Reel Tension Spring | 1 | |
| 3-3 | PJDG5071Z | Correct Reel Gear | 2 | |
| 3-4 | PJDJ08271RZ | Bushing, Carrier (L) | 1 | |
| 3-5 | PJHR548Z | Stop Pawl, Tape Feed | 1 | |
| 3-6 | PJDG5637X | Ribbon Feed Gear | 1 | |
| 3-7 | PJDS5107Z | Spring, Adjust | 2 | |
| 3-8 | PJMD2012Z | Holder, Cam Follower | 1 | |
| 3-9 | PJDS3150Z | Spring, Cam Follower | 1 | |
| 3-10 | PJDY135Z | Cam Follower | 1 | |
| 3-11 | PJHG711Z | Rubber, Cam Follower | 1 | |
| 3-12 | PJWQ1XR335M | Daisywheel Motor Assembly | 1 | |
| 3-13 | PJDJ03051FZ | Wheel Shaft Bushing | 1 | |
| 3-14 | PJHR9103Z | Latch Lever | 1 | |
| 3-15 | PJDS7019Z | Initialize Lever Spring | 1 | |
| 3-16 | PJZG1XR340M | Daisywheel Gear Assembly | 1 | |
| 3-17 | PJDF553Z | Slide Shaft, Carrier | 1 | |
| 3-18 | PJDS9076Z | Clip | 1 | |
| 3-19 | PJMU48Y | Sub Carrier Frame | 1 | |
| 3-20 | PJDS4200Z | Spring | 1 | |
| 3-21 | PJFP29Z | Hammer Solenoid | 1 | |
| 3-22 | PJBD17Z | Daisywheel Release Lever | 1 | |
| 3-23 | PJDY132W | Hammer Shaft | 1 | |
| 3-24 | PJDS7008X | Spring, Hammer | 1 | |
| 3-25 | PJDE92Z | Hammer | 1 | |
| 3-26 | PJZCXR340M | Card Holder Assembly | 1 | |
| 3-27 | PJDY134Z | Shaft, Cam Gear | 1 | |
| 3-28 | PJHR9110Z | Feed Pawl, Ribbon | 1 | |
| 3-29 | PJHR9017Y | Slider, Feed Pawl | 1 | |
| 3-30 | PJZG2R440M | Cam Assembly | 1 | |
| 3-31 | PJMU51Z | Front Support | 1 | |
| 3-32 | PJWQ2XR335M | Ribbon Feed Motor Assembly | 1 | |
| 3-33 | PJMU49Z | Carrier Frame | 1 | |
| 3-34 | PJDJ08251RZ | Bushing, Carrier (R) | 1 | |
| 3-35 | PJHS951Z | Oil Felt | 1 | |
| 3-36 | PJDS4042Z | Spring, Lock Lever (L) | 1 | |
| 3-37 | PJZFXR340M | Lock Bar Assembly | 1 | |
| 3-38 | PJJS430Z | Carrier Connector (CN500) | 1 | |
| 3-39 | PJHR9102Z | Rear Slider | 1 | |
| 3-40 | PJJE68Z | Sensor Lead | 1 | |
| 3-41 | PJVSFR1Z | Reed Switch (SW501) | 1 | |
| 3-42 | XWC3B | Washer | 1 | |
| 3-43 | PJNW310Z | Plastic Washer | 1 | |
| 3-44 | PJDS4043Z | Spring, Lock Lever (R) | 1 | |
| 3-45 | PJUP228Y-A | Carrier Bare PCB | 1 | |
| 3-46 | PJUP228Y-B | Ribbon Sensor Bare PCB | 1 | |
| 3-50 | XUCR4FY | E-ring | 1 | |
| 3-51 | XUC2FY | E-ring | 4 | |
| 3-52 | XTW3+U12L | Screw 3×12 mm | 1 | |
| 3-53 | XTN3+6F | Screw 3×6 mm | 4 | |
| 3-54 | XYN3+C4 | Screw 3×4 mm | 2 | |
| 3-55 | XTN26+12F | Screw 2.6×12 mm | 1 | |
| 3-56 | XTN26+8G | Screw 2.6×8 mm | 1 | |
| 3-57 | XTN2+4F | Screw 2×4 mm | 1 | |
| 3-58 | XWG25 | Washer | 1 | |

## 4. Keyboard

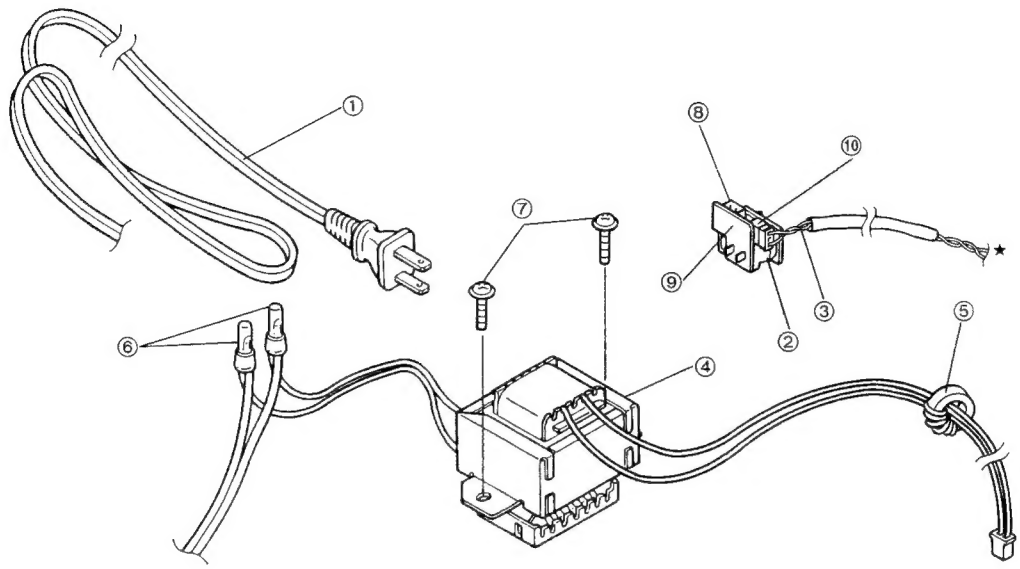




| Ref. No. | Parts No. | Parts Name and Description | Per Set | Remarks |
|---|---|---|---|---|
| 4-1 | PJSHX216Z | Keyboard Complete | 1 | |
| 4-2 | PJUL54Z | Key Top Support (S) | 1 | |
| 4-3 | PJUL52Z | Key Top Support (L) | 1 | |
| 4-4 | PJUL53Z | Key Top Support (M) | 1 | |
| 4-5 | PJHG953Z | Rubber, Contact | 1 | |
| 4-6 | PJVDU21VLD39 | Keyboard LED | 1 | |
| 4-7 | PJHR565Z | Keyboard Sheet | 1 | |
| 4-8 | PJUP250Z | Keyboard FPC | 1 | |
| 4-9 | PJMD2013Z | Keyboard Frame | 1 | |
| 4-10 | PJJE104Z | Lead Wire (3P) | 1 | |
| 4-11 | LN242RP | LED (D401,D402) | 2 | |
| 4-12 | PJUP247Z | LED Bare PCB | 1 | |
| 4-13 | PJDS5124Z | Key Spring | 58 | |
| 4-14 | PJDS5171Z | Space Key Spring | 2 | |
| 4-15 | PJDS5144Z | Return Key Spring | 1 | |

| Ref. No. | Parts No. | Parts Name and Description | Per Set | Remarks |
|---|---|---|---|---|
| 4-25 | PJBZ6078Y | Key Top, MAR REL | 1 | |
| 4-26 | PJBZ6079Y | Key Top, 1 ! | 1 | |
| 4-27 | PJBZ6080Y | Key Top, 2 @ | 1 | |
| 4-28 | PJBZ6081Y | Key Top, 3 # | 1 | |
| 4-29 | PJBZ6082Y | Key Top, 4 $ | 1 | |
| 4-30 | PJBZ6083Y | Key Top, 5 % | 1 | |
| 4-31 | PJBZ6084Y | Key Top, 6 ¢ | 1 | |
| 4-32 | PJBZ6085Y | Key Top, 7 & | 1 | |
| 4-33 | PJBZ6086Y | Key Top, 8 * | 1 | |
| 4-34 | PJBZ6087Y | Key Top, 9 ( | 1 | |
| 4-35 | PJBZ6088Y | Key Top, 0 ) | 1 | |
| 4-36 | PJBZ6089Y | Key Top, — – | 1 | |
| 4-37 | PJBZ6090Y | Key Top, = + | 1 | |
| 4-38 | PJBZ6091Y | Key Top, BACK SPACE | 1 | |
| 4-39 | PJBZ6772Z | Key Top, TEXT PRINT | 1 | |
| 4-40 | PJBZ6645Y-1 | Key Top, TAB D TAB | 1 | |
| 4-41 | PJBZ9047Y | Key Top, Q | 1 | |
| 4-42 | PJBZ6474Y-1 | Key Top, W XX XX | 1 | |
| 4-43 | PJBZ9049Y | Key Top, E | 1 | |
| 4-44 | PJBZ6646Y-1 | Key Top, P RMF | 1 | |
| 4-45 | PJBZ9053Y | Key Top, T | 1 | |
| 4-46 | PJBZ9054Y | Key Top, Y | 1 | |
| 4-47 | PJBZ6475Y-1 | Key Top, U XX XX | 1 | |
| 4-48 | PJBZ6647Y-1 | Key Top, I P INDENT | 1 | |
| 4-49 | PJBZ9060Y | Key Top, O | 1 | |
| 4-50 | PJBZ6648Y-1 | Key Top, P STOP | 1 | |
| 4-51 | PJBZ6113Y | Key Top, 1/2 1/4 β ç | 1 | |
| 4-52 | PJBZ6114Y | Key Top, £ £ ¨ ^ | 1 | |
| 4-53 | PJBZ6649Y-1 | Key Top, X TEXT CLR | 1 | |
| 4-54 | PJBZ6694Z-1 | Key Top, LOCK CAPS | 1 | |
| 4-55 | PJBZ9072Y | Key Top, A | 1 | |
| 4-56 | PJBZ9073Y | Key Top, S | 1 | |
| 4-57 | PJBZ9075Y | Key Top, D | 1 | |
| 4-58 | PJBZ9076Y | Key Top, F | 1 | |
| 4-59 | PJBZ9077Y | Key Top, G | 1 | |
| 4-60 | PJBZ6654Y-1 | Key Top, H HALF SP | 1 | |
| 4-61 | PJBZ6655Y-1 | Key Top, J MICRO SP | 1 | |
| 4-62 | PJBZ9082Y | Key Top, K | 1 | |
| 4-63 | PJBZ9083Y | Key Top, L | 1 | |
| 4-64 | PJBZ9084Y | Key Top, ; : | 1 | |
| 4-65 | PJBZ6099Y | Key Top, ' " | 1 | |
| 4-66 | PJBZ7775Y | Key Top, RETURN | 1 | |
| 4-67 | PJBZ7556Y | Key Top, SHIFT | 1 | |
| 4-68 | PJBZ9094Y | Key Top, Z | 1 | |
| 4-69 | PJBZ9096Y | Key Top, X | 1 | |
| 4-70 | PJBZ6658Y-1 | Key Top, C CENTER | 1 | |
| 4-71 | PJBZ9099Y | Key Top, V | 1 | |
| 4-72 | PJBZ6659Y-1 | Key Top, B BOLD | 1 | |
| 4-73 | PJBZ9102Y | Key Top, N | 1 | |
| 4-74 | PJBZ9103Y | Key Top, M | 1 | |
| 4-75 | PJBZ6101Y | Key Top, , , ¡ | 1 | |
| 4-76 | PJBZ6102Y | Key Top, . . ¿ | 1 | |
| 4-77 | PJBZ6103Y | Key Top, / ? ~ | 1 | |
| 4-78 | PJBZ7560Y | Key Top, SHIFT | 1 | |
| 4-79 | PJBZ6773Z | Key Top, TAB SET TAB CLR | 1 | |
| 4-80 | PJBZ7563Y-3 | Key Top, CODE | 1 | |
| 4-81 | PJBZ6774Z | Key Top, RELOC EXP | 1 | |
| 4-82 | PJBZ7565Y | Key Top, SPACE | 1 | |
| 4-83 | PJBZ6775Z | Key Top, QUICK ERASE LINE | 1 | |
| 4-84 | PJBZ6662Y-1 | Key Top, INDEX REV. INDEX | 1 | |

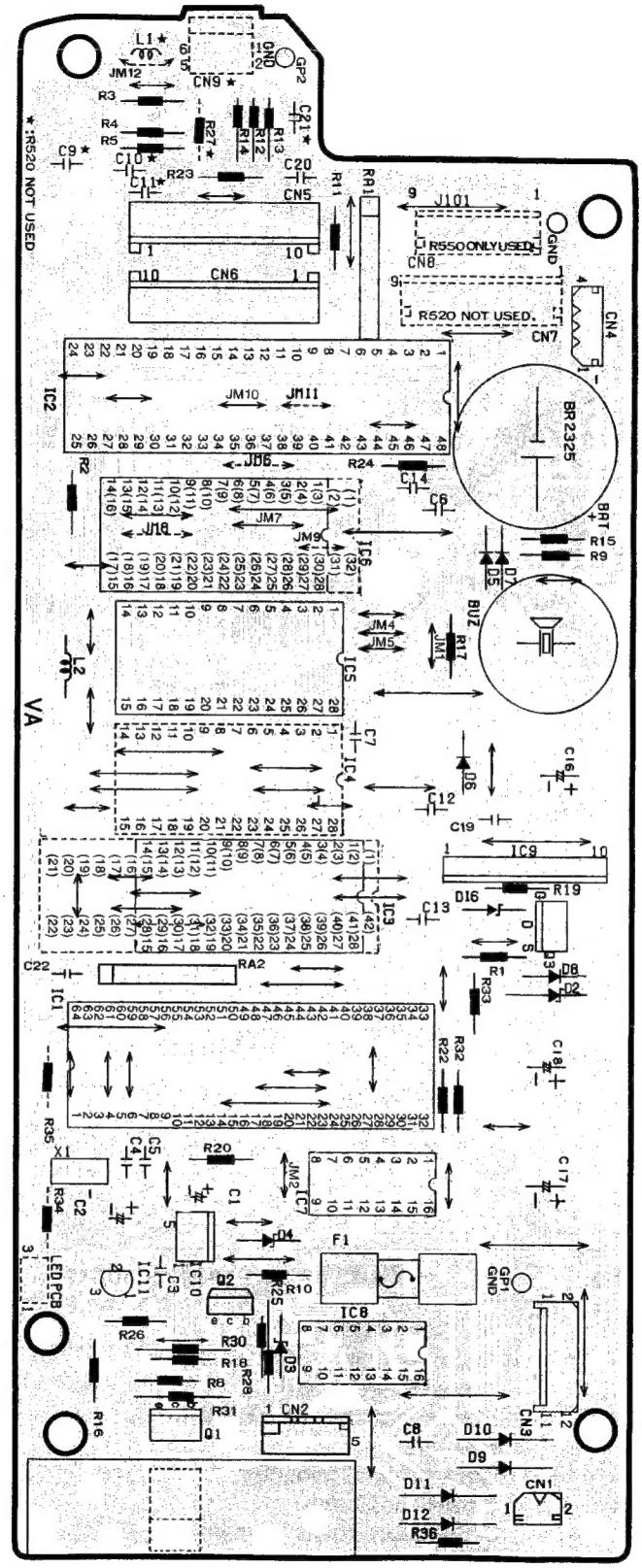
## 5. Power Supply




* To the Main Logic Board

| Ref. No. | Parts No. | Parts Name and Description | Per Set | Remarks |
|---|---|---|---|---|
| 5-1 | PJJA121Z | AC Cord (120V) | 1 | ⚠ |
| 5-2 | EST2011B | Power Switch | 1 | |
| 5-3 | PJJE639Z | Power Switch Lead | 1 | |
| 5-4 | PJLT5U9 | Power Transformer (120V) | 1 | ⚠ |
| 5-5 | PJJN8Z | ES Core | 1 | |
| 5-6 | PJJT68Z | Closed End Connector | 2 | ⚠ |
| 5-7 | XTW3+12S | Screw 3×12 mm | 2 | |
| 5-8 | PJJP43Z | Connector, Power Transformer (CN401) | 1 | |
| 5-9 | PJUP289V-B | Power Switch Bare PCB | 1 | |
| 5-10 | PJJP52Z | Connector, Power Switch (CN402) | 1 | |

## 6. Main Logic Board




(Parts side view)

Note: JM4, JM5, JM7 and JM10 are installed.

| Ref. No. | Parts No. | Parts Name and Description | Per Set | Remarks |
|---|---|---|---|---|
| **Integrated Circuit, Transistors and Diodes** | | | | |
| IC1 | PJVIHD63B3XP | IC | 1 | |
| IC2 | PJVIM7032H | IC | 1 | |
| IC3 | PJVIM6364MA | IC RAM | 1 | |
| IC5 | PJWI1R520M | IC ROM | 1 | Type A |
| IC6 | PJWI2R520M | IC ROM | 1 | Type A |
| IC6 | PJWIR520M | IC ROM | 1 | Type B |
| IC7 | PJVIBA12003 | IC | 1 | |
| IC8 | PJVIM54532P | IC | 1 | |
| IC9 | PJVITA7288P | IC | 1 | |
| IC10 | PJVIL78LR05C | IC | 1 | |
| IC11 | PJVIM5236L | IC | 1 | |
| D2 | MA2240LF | Diode (Zener) | 1 | |
| D3,4 | PJVD05AZ24 | Diode (Zener) | 2 | |
| D5-7 | PJVD1S2076 | Diode | 3 | |
| D8 | PJVD1N4003 | Diode | 1 | |
| D9-12 | PJVDRL203F | Diode | 4 | |
| D16 | PJVD05AZ12 | Diode (Zener) | 1 | |
| Q1 | 2SA1470S | Transistor | 1 | |
| Q2 | 2SB909MQR | Transistor | 1 | |
| Q3 | 2SK1059 | Transistor | 1 | |
| **Resistors** | | | | |
| R1-5 | ERD25FJ101 | 100 1/4W Carbon | 5 | S |
| R8 | ERD25FJ221 | 220 1/4W Carbon | 1 | S |
| R9 | ERD25FJ331 | 330 1/4W Carbon | 1 | S |
| R10,11 | ERD25FJ561 | 560 1/4W Carbon | 2 | S |
| R12-14 | ERD25FJ152 | 1.5K 1/4W Carbon | 3 | S |
| R15 | ERD25FJ122 | 1.2K 1/4W Carbon | 1 | S |
| R16 | ERO25TKD1001 | 1K 1/4W Metal | 1 | |
| R17,32 | ERD25FJ222 | 2.2K 1/4W Carbon | 2 | S |
| R18 | ERO25TKD8871 | 8.87K 1/4W Metal | 1 | |
| R19,36 | ERD25FJ472 | 4.7K 1/4W Carbon | 2 | S |
| R20,22-24 | ERD25FJ103 | 10K 1/4W Carbon | 4 | S |
| R25 | ERG2SJ121S | 120 2W Metal | 1 | |
| R26 | ERD25FJ153 | 15K 1/4W Carbon | 1 | S |
| R28,33 | ERD25FJ223 | 22K 1/4W Carbon | 2 | S |
| R30,31 | ERX2SJ8R2S | 8.2 2W Metal | 2 | |
| R34,35 | ERD25FJ102 | 1K 1/4W Carbon | 2 | S |
| RA1 | EXBP88472K | Resistor Array (4.7K × 8) | 1 | |
| RA2 | EXBP88103K | Resistor Array (10K × 8) | 1 | |
| **Capacitors** | | | | |
| C1 | ECEA1HUR33 | 0.33 50V Electrolytic | 1 | |
| C2 | ECEA0JU102 | 1000 6.3V Electrolytic | 1 | |
| C3 | ECKD1H102KB | 1000P 50V Ceramic | 1 | S |
| C4-8,12 | ECKD1H103ZF | 0.01 50V Ceramic | 6 | S |
| C13,14 | ECFD1E104ZF | 0.1 25V Semi-Conductor | 2 | S |
| C16 | ECEA1CSS472 | 4700 16V Electrolytic | 1 | |
| C17,18 | ECEA1ESS332 | 3300 25V Electrolytic | 2 | |
| C19,20 | ECFD1E104ZF | 0.1 25V Semi-Conductor | 2 | S |

* This model has two types of ROM combinations. The following chart demonstrates combinations of Type A and Type B.

| | IC5 | IC6 | JM1 |
|---|---|---|---|
| Type A | PJWI1R520M | PJWI2R520M | None |
| Type B | None | PJWIR520M | Yes |

| Ref. No. | Parts No. | Parts Name and Description | Per Set | Remarks |
|---|---|---|---|---|
| | | **Other Parts** | | |
| BAT | BR2325-1HC | Lithium Battery | 1 | |
| BUZ | EFB-RD22C41 | Buzzer | 1 | |
| CN1 | PJJP195Z | Connector, Power Switch | 1 | |
| CN2 | PJJP95Z | Connector, SP. Motor | 1 | |
| CN3 | PJJS419Z | Connector, Carrier | 1 | |
| CN4 | PJJP123Z | Connector, LF. Motor | 1 | |
| CN5,6 | PJJS227Z | Connector, Keyboard | 2 | |
| F1 | XBA1C30NU100 | Fuse 125V 3A | 1 | ⚠ |
| GP1,2 | PJJP283Z | Ground Wire Pin | 2 | |
| L2 | PJLQ7Z | ES Bead | 1 | |
| PB1 | PJWPR520M | Main PCB Complete | 1 | * |
| X1 | PJVCST6.00MG | X'Tal | 1 | |
| 6-1 | XTB3+8J | Screw 3×8 mm (for Transistor) | 1 | |
| 6-2 | XTW3+8S | Screw 3×8 mm (for Heat Sink) | 2 | |
| 6-3 | XWC3B | Washer | 2 | |
| 6-4 | PJJT192Z | Ground Wire (GP1, Long) | 1 | |
| 6-5 | PJJT193Z | Ground Wire (GP2, Short) | 1 | |

**CAUTION:**
The lithium battery is a critical component (type No. BR2325-1HC).
Please observe proper polarity and exact location when replacing it.

## 7. Packing Materials

| Ref. No. | Parts No. | Parts Name and Description | Per Set | Remarks |
|---|---|---|---|---|
| P1 | PJQX6029Z | Instruction Book | 1 | |
| P2 | PJPG744Z | Carton Box | 1 | |
| P3 | PJPN292X | Pad (L) | 1 | |
| P4 | PJPN293Z | Pad (R) | 1 | |
| P5 | PJPE193Z | Plastic Bag | 1 | |